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ORIGINAL COMMUNICATIONS.

A PRELIMINARY REPORT OF SCHICK TESTING AND PERMANENT IMMUNIZATION AGAINST DIPHTHERIA, IN THREE THOUSAND CHILDREN.*

BY EDWARD L. BAUER, M.D.,

In Charge of Schick Testing and Active Immunization for the Philadelphia Department of Health.

The incidence of diphtheria has assumed a level that varies but slightly from year to year, despite the present prophylactic measures employed to reduce it. True, isolation of cases and carriers, together with passive immunization, has brought the statistics bearing on diphtheria to a gratifying minimum, but something further must be done if the disease is to be eradicated. To this end the proper use of Schick testing and active immunization against diphtheria by means of toxin-anitoxin has, in the light of recent experience, given us more than the mere hope that this disease can be eliminated.

The Schick test is a test that determines by a local reaction, or the absence thereof, whether an individual is or is not susceptible to diphtheria. To be more precise, the test as we perform it determines negatively whether an individual has at least 0.1 unit of natural diphtheria antitoxin in each Cc. of blood, or positively has less than 0.1 unit, or none at all, in each Cc. of blood. A person who has 0.1 unit to each Cc. of blood has quite sufficient to protect against an attack of diphtheria. This has been verified from the clinical and laboratory standpoint by von Behring, Park, Römer, and others.[1] That the Schick test actually demonstrates this arbitrary dividing line between susceptibles and non-susceptibles can be demonstrated by correlating the Schick test and the actual blood examination in the same individuals.

In Schick testing, following the technique of Park,[2] we use 1/50 M.L.D. of diphtheria toxin for the guinea-pig in 0.2 Cc. normal saline. This we inject into the superficial layers of the skin of the left forearm immediately below the antecubital space. We use a 1-Cc. Luer tuberculin syringe, and a sharp ¾-inch length 24-gauge needle. There will be a raised white area sometimes pitted by hair follicles at the point of injection, undisputed evidence that the dose has been properly delivered. The preparation of the arm by cleansing with alcohol and a clean needle washed in alcohol, together with a sterile syringe, are important. Emphasis should be laid upon the fact that the test should be intracutaneous, for if the injection gets below the denser superficial layers a delayed reaction may result. If it gets under the skin, a subcutaneous injection, there will be no reaction whatever, because of immediate diffusion of the dose. We make our readings at the expiration of seventy-two hours.

The positive reaction will show at this time a definite circumscribed area of redness that is rough and dusky—"scaling redness" of Zingher.[3] This gradually develops a brownish pigmentation that desquamates when it fades. The negative reaction shows nothing. However, in adults and in

*Read before the Philadelphia Pediatric Society, April 13, 1920.

older children a pseudo-reaction occurs in thirty-eight per cent or more. This reaction resembles somewhat a positive reaction, but occurs earlier and fades more rapidly. Both reactions may occur in one and the same individual in the same test. Therefore we make our readings at seventy-two hours, so as to eliminate as far as possible the pseudo-reaction. Where using a control test on the right arm, the toxin is heated first to 75° C. for fifteen minutes, before dilution. The pseudo-reaction alone will occur in this control, and the test can be read at forty-eight hours. It is often wise, however, in using either method to make several readings at varying intervals.

We have made our observations on three thousand children, and many interesting facts have been brought to light. In the first place, our percentages have been strikingly similar to those of Park and Zingher, whose table arranged according to age is as follows:[2]

Age.	Susceptible.
Under 3 months.....	15 per cent.
3 to 6 months.....	30 per cent.
6 months to 1 year.....	60 per cent.
1 to 2 years.....	70 per cent.
2 to 3 years.....	60 per cent.
3 to 5 years.....	40 per cent.
5 to 10 years.....	30 per cent.
10 to 20 years.....	20 per cent.
Over 20 years.....	12 per cent.

Their figures are based upon a far larger number of children than we have tested, but as our work progressed, we noticed that our percentages approached their figures as an average, with greater consistency the larger the number of tests performed. Our percentages are given as follows:

Age.	No. pos.	No. neg.	Susceptible.
6 mos. to 3 yrs.....	35	29	72.5%
3 to 5 yrs.....	92	108	46.0%
5 to 10 yrs.....	324	466	32.4%
10 to 20 yrs.....	565	1258	28.2%
Over 20 yrs.....	44	239	13.2%
Totals .....1060 (3160 tests performed)		2100	31.8%

We have noted that the percentage of positives in girls is about five per cent higher than in boys. The percentage of pseudo-reactions in girls is far larger than in boys. Park calls attention to the fact that children in the same families give similar reactions, and if there be any exceptions it is the oldest child or young infant that gives the negative. This has been repeatedly brought to our attention by the physicians and secretaries in the institutions where our observations have been made. Reference to the tables of percentage susceptible will show that infants up to six months enjoy an immunity that is lost in a large number of cases. This is due to a transmission of the mother's immunity, probably through the placenta, and calls attention to the constancy of similar reactions in both mother and child. Zingher calls attention to this, and in our limited number of cases it has always worked out. The mother's immunity in the infant, however, may last longer than six months. We have observed, too, that in individuals who have had clinical diphtheria, fully eighty per cent give Schick reactions, even in those who have had the disease but a few weeks prior to the test. At least forty out of fifty children who have been diagnosed as diphtheria and have made complete recoveries still give positive reactions. Let it be noted here that diphtheria antitoxin used therapeutically will obscure a positive Schick temporarily. About two hundred children whose Schick tests were negative upon the first testing continued to show negative reactions from three to six months afterward. They were chosen indiscriminately for retesting from the negative lists, for the sole purpose of checking up the previous work. We had none to give positive reactions after an original negative.

The consistency of the Schick test is apparent in the approximation of the percentage of different observers in large groups of cases; it is demonstrable in the uniformity of the reaction in repeated testing of the same individual; it is proven by the simultaneous testing of the blood in guinea-pigs against ascending doses of diphtheria toxin.

What then is the clinical value of the Schick test? Obviously it cannot be made at the time of the illness in cases of membranous sore throat for purposes of differential diagnosis, because of the length of time necessary to make the readings. For the same reason it is hardly practical to make the test in individuals directly exposed to diphtheria with the object of immunizing only the susceptibles. The Schick test therefore finds its greatest usefulness in connection with some method of perma-

nent immunization against diphtheria, not necessarily bearing any relation to any case or epidemic of diphtheria.

With that object in view, Schick testing has been associated with the use of toxin-antitoxin, which we have come to believe is a successful agent for developing a permanent immunity against diphtheria. It is needless to say that diphtheria antitoxin itself confers but a passive immunity, that its value as an immunizing agent is but temporary, and the individual plays no part in the process that renders him immune. Toxin-antitoxin, by repeated injections, gradually produces an active immunity rather slowly, and it represents probably a combination of the active immunity, similar to that developed by vaccines, and the stimulation of the development of the natural immunity that would otherwise develop more gradually later in life.

This is the position of Park[3] and Zingher,[1] in which I am inclined to concur. For if it represented the first type of immunity only, the type represented by vaccines, it would not last longer than two or probably three years at the most. If, however, it were entirely a stimulation of the natural gradual tendency to immunity, the result, while it would be permanent, would be even more slow in its development than it is at present.

We give toxin-antitoxin in three doses, one Cc. at each dose, at seven-day intervals. The point of maximum immunity may be reached at any time in from four to twelve weeks, but in a few individuals in a somewhat longer period. Our experience has shown us that all but a negligible number will have attained their maximum immunity in twelve weeks.

Park's toxin-antitoxin,[2] which we use exclusively, represents about eighty-five per cent of an L plus dose of toxin in each unit of antitoxin. The mixture should be prepared with a strong diphtheria toxin so that each dose of one Cc. of the finished mixture will contain at least 2.5 almost neutralized L plus doses of toxin. These mixtures may be stronger, containing as high as 5 L plus doses, never weaker, the usual supply running at about 3.5 to 3.75 L plus doses of toxin to 3.5 units of antitoxin. Five Cc. of the mixture injected subcutaneously in the guinea-pig should cause a local induration and late paralysis, but never an acute death of the animal. This condensation paraphrases Park, and is of vital importance to all who wish to use a safe, active mixture. We use a 5-Cc. Luer syringe, properly sterilized, and the sterile 24-gauge ¾-inch length needle. The injection is made subcutaneously at the insertion of the deltoid muscle, the skin being washed and cleansed with alcohol.

We have immunized one thousand one hundred persons that we have found to be susceptible to diphtheria by Schick testing. Practically all received the three injections of toxin-antitoxin. Retesting two hundred of these at the end of five months we found that all had a negative test. No retest has as yet been positive. Of the remainder, not sufficient time has elapsed to make a report on the retest, and some are no longer available. These consistent negatives in previously actively immunized children encourage us to go on with the work. All of our work done, both in testing and in active immunization, has been done under the direction of the Philadelphia Department of Health, and has been rigidly and painstakingly verified by Doctor A. A. Cairns on behalf of the department.

Our work in Philadelphia does not indicate how long the immunity will last in a given case, but earlier observers can help us draw conclusions. Park[2] and Zingher[3] have been in the field for at least five years, and by careful, frequent retesting show that their immunized subjects still maintain their immunity. Thomas Lilly has been using the Schick test and toxin-antitoxin since 1915, and asserts his reduction to *nil* of diphtheria in the Industrial School for Boys, Shirley, Mass., is due to this technique. He states that where he has been able to follow the children in retests made from three months to three years, they have all maintained their immunity. He also records the experience of Dr. F. A. Finnagan, district officer of the Massachusetts Department of Health, at the Baldwinville Hospital Cottage for Crippled and Epileptic Children, in the same vein. C. A. Earle, in a personal

communication, gives the same encouraging report from St. Mary's Training School, Des Plaines, Ill., where he has had eleven hundred children under observation for two and one-half years, following Schick testing and active immunization, with no diphtheria. The observations of these men tend to emphasize the increasing development of immunity in individuals following toxin-antitoxin. We know from these observations that individuals are immune for five years, and believe that it must therefore be permanent.

The question of reactions in administering toxin-antitoxin is a matter of considerable interest. A reaction occurs in a few individuals and varies in severity, depending upon the age of the patient, because of the foreign protein contained in the mixture used. This foreign protein is now being removed, and even greater reduction with its lessening severity of reaction is promised us shortly. Young children give no reaction. The reaction occurs usually in an ascending percentage, from eight to ten years, where a red arm is its maximum, to adult life, where malaise, headache, fever 102° to 103°, joint pains, and leucocytosis may occur. The red arm may be anything from a red area the size of a dollar to an area occasionally involving half the arm. The local application of saturated solution of magnesium sulphate and sometimes a dose internally are all that these patients need. The reaction usually occurs after the first injection, and is milder after the second and third dose, if it occurs at all. I have never seen a serum rash follow administration of toxin-antitoxin. At Girard College, where over five hundred boys received toxin-antitoxin, nineteen per cent gave a reaction. Dr. F. L. Greenwalt, the attending physician, stated that he was of the opinion that the reactions were in no case severe, and with less general disturbance than comes usually after vaccination against smallpox.

It is quite obvious, then, that since the younger children are more susceptible to diphtheria, and give no reaction to toxin-antitoxin, the sooner they are actively immunized the better. Our attention was called to the fact that infants could be given relatively larger doses of toxin-antitoxin as early as the first, second, and third week of life, with no reaction whatever. Zingher notes that the transition from mother's transmitted immunity to the baby's own active immunity was never marked by a positive Schick test when the mixture was administered during the first month of life. We have had thirty infants under six months of age, fifteen of whom were given three doses of toxin-antitoxin 0.5 Cc. in each dose at weekly intervals, and after retesting over a period of nine months but one showed a faintly positive Schick test that disappeared without further toxin-antitoxin mixture. This child was over five months old when the mixture was administered. The positive Schick occurred at its seventh month. At nine months it was again negative. The other fifteen infants were given one Cc. each for three doses at weekly intervals. The age of these children approximated the ages of the first group, and in this group there were no positive Schick tests. In this group of thirty infants or in any child under six years of age we have not seen a reaction of toxin-antitoxin of any type or description. It would then follow that the proper course of procedure would be the universal injection of all babies at their first, second, and third week with toxin-antitoxin.

As a result of these investigations we have been led to believe that the proper way to meet the diphtheria problem is by the universal injection of all babies under two years of age with toxin-antitoxin—the earlier the better; the Schick testing and permanent immunization of all other preschool age children; the Schick testing of all school children with the administration of toxin-antitoxin to the susceptibles. Dealing with adults, the groups that should be Schick tested are the physicians, nurses, assistants, maids and orderlies in all hospitals; all recruits in the Army and Navy; attendants, matrons, and nurses in all institutions dealing with children. Toxin-antitoxin should be administered to such adults as are susceptible, who will by the nature of their duties be exposed to diphtheria with more

or less regularity. This of course will include doctors and nurses and other employees in contagious disease hospitals. We can conclude, therefore, that while the incidence of diphtheria has been reduced considerably by the isolation of cases, the culture of contacts and passive immunization, greater reductions can surely be made by universal Schick testing and active immunization of susceptibles, even to the relegation of diphtheria to the class of conquered diseases, in the annals of medical history.

1. Personal Communication; and Zingher, A.: Active Immunization of Infants against Diphtheria. Reprint Series 1918, Dept. Health, New York City, *et al.*

2. Park: *Monthly Bulletin Dept. Health*, vol. 9, No. 3, March, 1919.

3. Zingher, A.: Further Studies with the Schick Test. *Archives of Int. Med.*, Sept., 1917, vol. 20, pp. 392-398.

4. Lilly, Thos.: *Boston Med. Journal*, January, 1920.

CLINICAL SYMPTOMS AND TREATMENT OF ACIDOSIS IN EARLY LIFE.[1]

BY J. C. GITTINGS, M.D.,

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Before discussing the clinical manifestations of acidosis, it would be well to emphasize three points:

First. "Acidosis is a depletion of the blood and tissues of the body in fixed bases" (Sellards), or, as often expressed, a "reduction in the alkali reserve."

Second. Acidosis is not a disease *per se*, but a condition resulting from various disturbances in the chemical processes of the body. No matter how great these changes may be in the direction of acid formation or retention, the accepted clinical picture of acidosis cannot result until the alkali reserve is depleted beyond normal limits. By appropriate procedure it is possible to determine the fact of such depletion.

Third. An acetone breath and acetonuria in infancy and childhood may, and often do, occur without any acidosis whatever. As Howland points out, the qualitative tests for the acetone bodies in the urine are so sensitive as to give a reaction in the presence of amounts too small to affect seriously the alkali reserve; only by quantitative blood analyses can a true index be obtained of a dangerous increase in the acetone bodies. In the interests of accurate diagnosis it is important that physicians realize that a positive test for acetone in the urine is not a sufficient basis for the diagnosis of an acidosis. On the other hand there is reason to believe that a true acidosis may be caused by an excess of acetone bodies, notably in diabetes mellitus.

Acidosis may arise in the course of a variety of diseases, as Dr. Jonas has indicated, and may be a direct cause, or an important contributing cause, for the gravity of the case.

For some years it has been customary to consider the cyclic vomiting of children as an instance of acidosis. While a true acidosis may occur in the course of some cases of cyclic vomiting, there is no reason to believe that it plays a definite rôle in the production of the attack, while there is no conclusive evidence of the existence of acidosis in the majority of cases.

With the exception just noted there are two and possibly three classes of disease in early life in which a serious acidosis occurs: First, acidosis with diarrhea—not of the ileocolitis type. This is the form described by Finkelstein as "food intoxication." A typical case will give a history of the sudden occurrence of vomiting and diarrhea, usually following a more or less prolonged state of poor digestion and nutrition.

The severity of the vomiting usually depends upon the administration of liquids, ceasing when all food and fluids are withheld. The diarrhea will vary in severity, watery at first, but, like the vomiting, depending in part upon the kind and amount of the food administered.

[1]Delivered before the Philadelphia County Medical Society, March 10, 1920.

After several days of this—the length of time often depending upon the amount of liquids lost in the ejecta—we may note a definite and rapidly increasing change in the clinical picture. The early moderate prostration will be succeeded by nervous irritability and excitement, with disturbed sleep and restlessness, at times with sudden shrill cries. Succeeding or alternating with this comes apathy and profound prostration. The loss of weight often exceeds in rapidity that of any other disease of infancy. The eyeballs almost visibly recede, the fontanelle becomes depressed, and the skin takes on a grayish pallor. More characteristic is the dryness of the skin and the loss of tissue "turgor" or resiliency, the subcutaneous tissues having a putty-like consistency. With the onset of the restlessness the temperature usually takes a higher range, rising, in fatal cases, to 105° or 106° or over, coincident with a stupor deepening into coma. The most characteristic symptom of all is a change in the respirations, soon to be followed by the typical breathing of the "air-hunger" type, first described by Küssmaul in the coma of diabetes. In this there is marked dyspnea without any physical basis from obstruction in the throat or air-passages, serious pathological change in the heart and lungs, or severe anemia. The breathing may not be greatly hurried, but is characterized by the depth and fulness of inspiration. Occasionally the rhythm may approach the Cheyne-Stokes type, but as a rule the sequence is regular and continuous, to become more shallow and irregular just before the fatal exitus. A noticeable feature of the air-hunger is the absence of cyanosis of the mucous membranes, so long as there is no cardiorespiratory disease; instead, the lips and tip and edges of the tongue may show a definite cherry-red color.

The air-hunger type of breathing is the only clear clinical evidence of the existence of acidosis. An acetone breath may be present, but, as before noted, is not conclusive. The tendency to drowsiness or stupor, however, or an unusual degree of restlessness in such cases, should always suggest the possibility of a beginning acidosis; and the employment of some of the tests to be described.

A fully developed air-hunger always marks the severity of the attack, and a majority of such cases end fatally regardless of the fact that the breathing itself may be mitigated or even checked by appropriate treatment. It is therefore clear that the acidosis *per se* is not the only fatal factor.

The second type with acidosis is considered to be due to an excess of the acetone bodies. It occurs commonly in infants from ten months to three years of age. There seems to be a greater tendency for it to appear during or shortly after weaning. The attack usually is ushered in with vomiting and a moderate diarrhea, sometimes with abdominal pains, but the gastrointestinal symptoms may not be especially severe. Acetone breath and acetonuria occur early and persist. The clinical symptoms of the acidosis resemble those described, but loss of weight and dehydration of the tissues are not pronounced. The initial attack is less apt to be fatal than is the diarrheal form, but there is a tendency to recurrence.

A third form with acidosis is described by Howland and Marriott, in cases of diarrhea of the infectious type, usually known as ileocolitis or dysentery. Clinically this resembles the first form except in the previous history and malnutrition, while dehydration of the tissues may not be so pronounced.

At present there is no satisfactory explanation for the causation of acidosis in infants. In the diarrheal type it has been suggested that the body has been depleted of alkali from the excessive stools. Steinitz, and later Holt, Courtney and Fales, found a negative sodium balance in these cases. The latter authors, however, also found an increased excretion of chlorides, which tended to establish a balance between loss of alkali and acid.

The occurrence of definite acidosis in nephritis, and especially in Asiatic cholera, in which, according to Sellards, acute nephritis develops in practically all severe cases, suggests renal insufficiency as a factor.

Certain facts are corroborative. Oliguria and even anuria usually occur in these cases, and Schloss has found pronounced diminution in phenolsulphonephthalein excretion even when no nephritis could be found at autopsy. He emphasizes the similarity in symptoms between cases of uremia and those with intestinal intoxication. In the latter he ascribes the renal insufficiency to the negative water balance (dehydration of the tissues) and the consequent oliguria. He considers that acidosis plays an important rôle, but that the essential cause is still unknown.

Marriott has found a marked increase of the organic phosphorus of the serum in some of these cases. We may recall that one of the most important functions of the kidney is the elimination of acid, in the form of acid phosphates, and Marriott's findings suggest that an insufficient elimination of acid through the kidneys may bear an etiologic relationship. In others, however, no increase of phosphorus in the serum could be found.

Under the general heading of perverted metabolism, with excessive formation of normal or abnormal acids, many theories have been advanced to account for the acidosis. According to Morse and Talbot, this occurs especially in cases in which the metabolism of fat is abnormal. It is probable that the etiology may partake in part of one or more of the factors enumerated, but the unknown factor still remains the most important.

PROGNOSIS.

The prognosis of acidosis depends upon the antecedent disease as well as upon the severity of the acidosis itself. Howland and Marriott, after wide experience, believe that "the acetone body type" shows the highest proportion of recoveries. Complicating an advanced case of infantile atrophy, the outcome of the acidosis is almost always fatal; as it is if chronic nephritis is present. In any case of acidosis in infancy, however, we must not be unprepared for a fatal outcome.

The whole course of the severer type from the appearance of air-hunger may be forty-eight hours or less. Under proper treatment and in less severe types, several days may elapse before recovery or death takes place.

DIAGNOSIS.

Definite diagnosis of acidosis should depend rather upon some of the laboratory aids than upon clinical symptoms, since the latter are merely suggestive and not conclusive, until the appearance of a definite air-hunger type of breathing. When this occurs the case already is well advanced. The suggestive preliminary symptoms therefore must always be borne in mind, especially in those conditions in which acidosis is likely to occur. An acetone odor to the breath should always suggest acidosis, although *per se* its significance may be slight. It will frequently be found in patients who, for any reason, are being deprived of food; after vomiting, from any cause; in the course of many of the infectious diseases; and in the acetone body type of acidosis. Its presence should always suggest a further investigation.

Extreme restlessness or drowsiness with or without an increase of fever in the course of gastrointestinal disturbance, especially if there be much vomiting and diarrhea, is suggestive. Both the restlessness and drowsiness are to be differentiated from beginning meningitis, especially the tuberculous form. The laboratory evidence of acidosis on the one hand, and lumbar puncture on the other, may be the only final means of diagnosis, but in acidosis there will be none of the definite signs of meningeal irritation, such as rigidity of the neck, spasticity, or paralyses. In the beginning of tuberculous meningitis also we do not as a rule find the rapid emaciation with the sunken eyeballs and depressed fontanelle of an acidosis.

The sudden onset with vomiting, if diarrhea be absent, as in the acetone body type, may suggest intussusception, but careful physical examination usually will develop the abdominal or rectal mass, and the bloody rectal mucus or stool, while direct evidence of acidosis is lacking.

LABORATORY EVIDENCE.

In the presence of any suspicion of acidosis, recourse should be had at once to two or more of the laboratory tests.

1. Appearance of acetone and diacetic acid in the urine. The importance of this as a test for clinical acidosis must never be overemphasized. To repeat: in infants and children acetone is frequently found in the urine under a variety of conditions in which there is disturbance of the carbohydrate metabolism without acidosis, and occurs almost constantly after vomiting and starvation; on the other hand, a pronounced reaction warrants further investigation. Its chief importance is in diabetes and the acetone body type of acidosis.

2. Increase in tolerance to sodium bicarbonate (Sellards' test). According to Sellards there will be a definite increase in tolerance to bicarbonate of soda in cases of early acidosis, when both blood and urine show negative findings to the usual laboratory tests. When tolerance to sodium bicarbonate is normal, Sellards further believes that acidosis can be excluded.

In a normal infant under three years of age, 2 grammes (30 grains) to 3 grammes (45 grains) of bicarbonate of soda will quickly render the urine alkaline to litmus and keep it so for ten to twelve hours. Enough urine can be collected for the test by placing a piece of absorbent cotton in the diaper. The bicarbonate can be administered, well diluted, by mouth, or if the child resists, by nasal tube. If vomiting interferes with retention, the stomach can be washed out and the dose of soda repeated through the tube. The test has the additional advantage of therapeutic value in a possible acidosis, while it is harmless in other conditions.

Persistence of an acid urine after sodium bicarbonate suggests acidosis; repeated administration of larger doses will prove the severity. A tolerance to four or five times or more of the initial dose may be observed in severe cases.

The disadvantages of the test are due to the delay or absence of urination. If no other diagnostic measures are feasible, catheterization under strict aseptic precautions may be justifiable provided the bladder is washed out with warm sterile 2-per-cent boracic solution before the soft-rubber catheter is removed.

3. Determination of the CO_2 tension in the alveolar air (Marriott's method). According to Howland and Marriott the CO_2 tension in the lungs of normal children varies from 40 to 45 mm. Tensions from 30 to 35 are found in mild acidosis, while 20 or less indicates considerable danger. In infants the tension ranges from 3 to 5 mm. lower than in older children. Dr. Jonas has indicated the rationale of this test. With the apparatus devised by Marriott, a reasonably accurate CO_2 determination can be made by any careful observer, after practice. A definite lowering of the tension below 30 mm. in the absence of any disease of the lungs, and an increased tolerance to bicarbonate of soda, constitute sufficient evidence for vigorous treatment.

4. If the determination of the CO_2 tension is not feasible, one of the tests of the blood should be employed. Of these, the Van Slyke method for the determination of the bicarbonate reserve of the blood plasma is the most satisfactory. It requires apparatus and a fair amount of laboratory experience. The details may be found in the original article (*Jour. Biol. Chem.*, 1917, xxx, 347).

A more simple but less sensitive test is the serum test of Sellards for determining the reaction of the serum to phenolphthalein.

Sellards' Serum Test.—One cubic centimeter of blood serum obtained by centrifuging 5 or 6 Cc. of blood is shaken thoroughly for a moment with 25 Cc. of neutral absolute alcohol and the alcohol filtered off through dry acid-free filter paper. This precipitates and removes the proteins. The filtrate, with a few drops of phenolphthalein, is evaporated to dryness on a water-bath. With normal human serum the residue is always red. In mild grades of acidosis the residue is colorless or pink, but becomes red upon the addition of a drop of water. In more marked grades

of acidosis the residue is colorless and remains colorless upon the addition of water. In extreme cases the diluted serum, without filtration, when boiled, remains colorless upon the addition of phenolphthalein.

Many specimens of absolute alcohol contain an appreciable amount of alkali or acid. To test for alkali, 50 Cc. are mixed with one drop of phenolphthalein and evaporated to dryness on a water-bath. The residue should be colorless after the addition of a drop of water. To test for acid, 50 Cc. are mixed with 1 Cc. N/100 sodium hydroxide and phthalein and evaporated to dryness. The residue should be red or become red upon the addition of a drop of water.

In a complete study of acidosis the determination of the ammonia nitrogen and the hydrogen ion concentration of the blood is desirable, but can be carried out only in well-equipped laboratories.

To sum up: in any case in which acidosis is suspected the urine should be tested for acetone and diacetic acid and the tolerance to sodium bicarbonate determined. If the latter shows definite increase of tolerance (urine acid after 2 or 3 grammes of sodium bicarbonate) the administration of soda by mouth or rectum is justified. In the absence of the definite air-hunger type of breathing, or if the tolerance test is not feasible, owing to anuria, the CO_2 tension should be determined or Sellards' serum test performed. If one or both are positive, sodium bicarbonate should be pushed both by mouth, rectum, and intravenously, with the safeguards to be detailed under treatment.

TREATMENT.

The treatment of acidosis according to modern tactics should begin, if possible, before acidosis appears—if such a Hibernianism be permissible. Preventive treatment might be extended to include the whole subject of the treatment of the various gastrointestinal diseases—a subject much too broad to be even touched upon.

In general we may say that in both preventive and curative treatment, the maintenance or replenishment of the water in the tissues and supplying alkali to prevent or overcome alkali depletion are the most important factors. The need for water is emphasized by the dry, putty-like skin and subcutaneous tissues which the patients of the diarrheal type so often show.

The diarrhea itself, if profuse and watery, must be checked—first by the withdrawal of all food. If the child has recently received food, a dose of castor oil should be given, followed in two hours by a high saline enema; if vomiting prevents the use of oil, two enemas may be given, two hours apart. As soon as the movements show no signs of milk curds or foul odor, paregoric in 5- to 15-drop doses should be given after each watery stool, the doses thereby being automatically limited.

It must be clearly understood, however, that we are attempting to prevent a loss of water and possibly of the alkalies; the passage of small stools consisting chiefly of mucus can be disregarded in this respect. With the withdrawal of all food we usually control also the vomiting, although a preliminary lavage with warm sterile water often is indicated.

To supply fluids we may first try mouth administration in quantities not less than 750 to 900 Cc. (25 to 30 ounces) in the twenty-four hours. If this is refused or vomited, the nasal tube may be used. A No. 8 to 12 soft-rubber catheter is greased well with vaselin, a few drops of liquid petrolatum are dropped into one nostril, and the tube inserted 10 to 11 inches. The end of the tube is then submerged in a cup of water. If the trachea has been entered bubbles of gas will appear. This accident is very unlikely, but might be disastrous if overlooked.

With the tube surely in the esophagus 180 to 250 Cc. (6 or 8 ounces) of sterile water are poured in. The barrel of a small glass syringe may be used if a sufficiently small funnel is not available. As a preventive this administration of water is especially efficacious.

In the presence of gastric intolerance, and also in severe cases of dehydration, we may use the rectal route, if diarrhea does

not prevent. Enteroclysis with normal saline can be done with the Murphy drip gauged to run 180 to 250 Cc. (6 to 8 ounces) in two hours, and repeated every four to six hours; or 90 to 120 Cc. (3 or 4 ounces) may be slowly injected (three to five minutes) and the tube removed—to be repeated every four hours. By either method rectal intolerance usually is established in forty-eight hours or less.

With the water, by mouth or rectum, may be combined sodium bicarbonate, in dose sufficient to render the urine alkaline but not to exceed 5-per-cent strength of the solution. Unfortunately, sodium bicarbonate in repeated large doses sometimes causes vomiting. In severe acidosis, therefore, other means for administering it must be used. As a preventive, in cases of severe diarrhea, doses of 0.3 to 0.6 gramme (5 to 10 grains) by mouth every three hours may be combined with bismuth subcarbonate.

In any case of severe dehydration we may employ intraperitoneal injections of normal saline solution, especially if there be gastric and rectal intolerance, but sodium bicarbonate cannot be used in this method. A moderately large, short-beveled needle should be used, after excluding the possible presence of an overdistended bladder. The needle should be inserted with a quick thrust in the median line just below the umbilicus. The thumb may be held on the needle about ¾ inch from the point, to prevent too deep penetration. The saline solution can then be run in rather slowly through a tube previously attached. The amount will depend upon conditions; usually from 250 to 300 Cc. (8 to 10 ounces) can be given. Any evidence of shock calls for immediate withdrawal of the needle, and appropriate stimulation. The importance of asepsis in every factor cannot be too strongly insisted upon. Physicians who have had no training in modern asepsis should not attempt the intraperitoneal injections. Another contraindication is extreme or even well-marked abdominal distention. The risk of puncture of the bowel or of inducing shock is too great.

In the presence of severe acidosis, mouth or rectal administration of sodium bicarbonate may be too slow. In these cases intravenous injections should be done. For these, also, a knowledge of surgical asepsis is a prerequisite.

The dose of the soda will depend upon the indications; usually a 4-per-cent solution is used. The amount of fluid to be used in intravenous injections is generally based upon an allowance of fluid equal to 1/60 of the body weight. In the presence of marked dehydration, slightly larger amounts are permissible, but the injections must always be made slowly. The dose of bicarbonate and the need for water may therefore be correlated with the weight of the child in determining what percentage of soda is to be used, so long as the strength of 4 per cent is not exceeded.

In infants the longitudinal sinus usually offers the easiest route, but the veins of the scalp, the external jugular, or the femoral may be used; or, in critical cases, a vein at the elbow may be exposed. So much has been written of late concerning the sinus route that repetition is hardly necessary.

In the use of sodium bicarbonate by the sinus, not more than 75 to 100 Cc. of a 4-per-cent solution should be injected, in from five to ten minutes; in older children, two or three times this amount. In other veins, larger amounts may be used as indicated.

The object of the use of soda must not be forgotten—to replenish the carbonates of the blood and tissues. The index of success in treatment is: (1) Change in reaction of urine from acid to alkaline, or amphoteric. (2) Restoration of the normal bicarbonate reserve of the plasma (Van Slyke's method). (3) Restoration of the normal CO_2 tension in the alveolar air (Marriott's method). (4) Restoration of the normal reaction of the blood serum to phenolphthalein (Sellards' method).

Relief of the air-hunger type of breathing is an obvious index, but is rarely obtained after the first dose. In determining the dose and interval for repetition, we must

make use of one of the "indices" lest we overload the blood stream with alkali.

The value of the urine test may be nullified by anuria, especially if a true nephritis be present. If we have used water freely by mouth, rectum, and peritoneum, anuria usually will be obviated, and while waiting for this a second injection of bicarbonate can be used safely in severe cases. Subsequent injection, however, should be based upon one of the "indices." When an alkaline or amphoteric urine is secreted, further dosage of soda should not be given until a definite acid reaction reappears. In mild cases of acidosis of the acetone body type, intravenous use of bicarbonate usually is unnecessary.

When large and repeated doses of soda have been used, however, we must be prepared for certain possible sequelæ, notably edema of the tissues; at times even tetany and convulsions, with a lowering of the calcium content of the blood. Howland and Marriott have found that such symptoms quickly subside after the administration of soda is stopped, but they suggest that magnesium sulphate may be administered subcutaneously as a prophylactic against tetany when massive doses of soda are to be given to young children.

The preparation of the sodium bicarbonate solution is of great importance, as it cannot be sterilized by heat without driving off carbon dioxide and reducing the bicarbonate to carbonate. The latter is too irritating to be used safely. Schloss found that sodium bicarbonate in bulk is always sterile. With freshly sterilized (cooled) water a 4-per-cent solution can be made from a freshly opened bottle of sodium bicarbonate, chemically pure. Only the product of standard chemical houses should be employed, and a rigid aseptic technique observed.

Water, in the form of sterile normal saline solution, can also be given subcutaneously. Only small amounts can be injected, and the method is painful. Its principal use is in case peritoneal injections are contraindicated and the stomach and rectum are intolerant. Sodium bicarbonate is apt to cause sloughs and should not be used subcutaneously.

With the withdrawal of food, especially in cases which are already seriously depleted from vomiting and diarrhea, it becomes necessary to administer some form of easily assimilable nourishment. The best is chemically pure glucose. The only definite contraindication is the presence of diabetes. In cases of acetone body type of acidosis, on the other hand, glucose is especially indicated. It may be given alone or combined with the soda, in 5-per-cent solution, by rectum, or subcutaneously; increasing to a 10-per-cent solution for administration by mouth or intravenously.

At the Children's Hospital we have also used a 5-per-cent glucose solution intraperitoneally, but in some cases it has caused definite irritation. Apparently this has not resulted in permanent harm, but we are disposed to reserve its use for especially severe types.

The administration of water, alkali, and glucose leaves little opportunity for diet, in a severe case of acidosis. With the abatement of symptoms the selection of a proper food theoretically is a difficult matter. Practically I have found that a low fat or fat-free buttermilk or Eiweiss-milk is the safest food for cases of the diarrheal type. For those of the ileocolitis type, especially with a predominating proteolytic intestinal flora, a milk-free cereal diet may be better tolerated. For the acetone body type, a fat-free Eiweiss-milk with sugar added, or a mixture of skim-milk with thick cereal gruel, is the best.

For stimulation in the acute stage of prostration we may use caffeine, camphorated oil, and digitalen, with whisky or brandy well diluted. Overtreatment must be avoided, and doses and other measures must be combined so as to allow time for rest in the intervals.

No cases will require more zealous attention, technical skill, and thoughtful judgment than will those with acidosis in infancy and early life.

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THE CHEMISTRY OF ACIDOSIS.[1]

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The chemical reactions which occur whereby the blood is able to maintain its constant reaction are made possible chiefly through the presence in the blood of two weak acids, phosphoric and carbonic, and their sodium salts, the latter being in excess and in proportions which can maintain a constant hydrogen ion concentration. These chemicals comprise the so-called buffer substances. They are:

(1) Disodium hydrogen phosphate (alkaline) Na_2HPO_4, and sodium dihydrogen phosphate (acid) NaH_2HPO_4.

(2) Sodium bicarbonate $NaHCO_3$ (alkaline), and carbonic acid H_2CO_3.

The salts of the weak acids have the property of combining with strong acids, and for each unit of strong acid added there is liberated a unit of weak acid and a neutral salt.

$M_2HPO_4+HA=MH_2PO_4+MA.$

$MHCO_3+HA=H_2CO_3+MA.$

M=basic radicle and A=acid radicle.

The phosphoric acid is eliminated by the kidneys, the carbonic acid by the lungs as carbon dioxide. Some phosphoric acid is eliminated by way of the intestinal tract.

The source of the acids and bases is partly exogenous from our food, partly endogenous as a result of metabolism—*i.e.*, lactic acid, phosphoric acid, sulphuric acid, and ammonia. The proteins of the blood and tissues and the ammonia resulting from the breaking down of amino acids likewise help to maintain the constant reaction. The amount of sodium base present is always in excess of that required to neutralize the normal fixed acids of the blood. This excess as sodium carbonate combines with carbonic acid to form sodium bicarbonate.

The normal bicarbonates of the blood yield between 60 and 70 vol. per cent of carbon dioxide. If the carbon dioxide falls below 60 vol. per cent, it is due to accumulation of acids in the body. It is because of the constancy of the carbon dioxide content of blood of normal individuals and its decrease in acidosis that Van Slyke has defined an acidosis as a decrease in the bicarbonate content of the blood.

The property of the blood bicarbonate to neutralize foreign acids without changing the reaction of the blood is best illustrated by adding a strong acid to a solution of bicarbonate of soda, using phenolphthalein as an indicator. Phenolphthalein colors an alkaline solution pink, while in an acid solution it is colorless. When the strong acid is added to the alkaline bicarbonate solution, it will be observed that the pink color of the bicarbonate solution remains unchanged, and that an evolution of gas occurs. The latter is due to the bicarbonate solution giving off carbon dioxide. This phenomenon depends upon the rapidity with which the sodium bicarbonate yields its carbon dioxide.

This is exactly what occurs in the blood when a foreign acid such as betaoxybutyric acid is present; it unites with sodium bicarbonate to become a neutral salt, while the carbon dioxide is eliminated by the lungs. The greater the amount of foreign acid present the greater the demand on the available supply of reserve alkaline base, with consequent diminution of the bicarbonate content of the blood.

The bicarbonate concentration of the blood and the hydrogen ion concentration are physiological constants in normal individuals. It is customary to use the term C_h as an abbreviation for the term hydrogen ion concentration. The C_h of the blood is a constant much less variable than the bicarbonate content; the C_h increases only in the late stages of acidosis, when the bicarbonate content has been greatly reduced.

The C_h bears a direct relationship to the ratio of carbon dioxide dissolved in arterial

[1]Read before the Philadelphia County Medical Society.

blood as carbonic acid, H_2CO_3, to the carbon dioxide bound as sodium bicarbonate. This ratio $\frac{H_2CO_3}{NaHCO_3}$ is constant in normal individuals and only changes after the bicarbonate has been considerably reduced.

We derive this ratio as follows: Since we know that the partial pressure of carbon dioxide in the blood is 42 mm. of mercury, we can calculate how much of the 60 vol. per cent is in simple solution. Plasma at body temperature and 760 mm. of mercury dissolves .54 per cent of carbon dioxide, so that at 42 mm. it will dissolve $42/760 \times 100 \times .54 = 3$ vol. per cent, so that we get the equation

$$\frac{H_2CO_3}{NaHCO_3} = \frac{3}{60} \text{ or } \frac{1}{20}$$

$$C_h = K\frac{H_2CO_3}{NaHCO_3} = \frac{1}{20}$$

It is the ventilation through the lungs that maintains this ratio. As long as the ratio 1/20 is maintained we have a compensated acidosis and no increase in the C_h, irrespective of how low the bicarbonate may be. If the lungs fail to maintain a proper ventilation the above ratio will be altered and we have an uncompensated acidosis and a change in the C_h of the blood.

The respiratory mechanism is an important factor in maintaining the constant C_h of the blood because the carbon dioxide is removed from the blood in the lungs. The alveolar carbon dioxide tension is dependent upon the carbon dioxide content of the blood, and therefore both the determination of the blood carbon dioxide content and of the alveolar carbon dioxide tension are tests for acidosis.

The respiratory center is very sensitive to the slightest change in the C_h, and therefore the rapid deep breathing of marked cases of acidosis is the endeavor on the part of the respiratory mechanism to respond to the stimulus of increased C_h. This increased rate and depth of respiration, Kussmaul breathing, is nature's way of increasing the ventilation in order to wash out more carbon dioxide in an attempt to again bring about a normal $C_h = K\frac{H_2CO_3}{NaHCO_3}$

The other avenue of exit which helps to maintain a constant C_h is through the kidneys.

I have already alluded to the reaction which occurs between acid and alkaline phosphates. They act as buffers in controlling the fixed acids of the body, such as phosphoric, sulphuric, lactic, etc., having the power like all buffers of uniting with strong acids and forming the neutral salt and a weak acid.

It is the selective action of the kidneys which determines whether urine be alkali or acid. If a great deal of acid is being formed in the body or entering in the food the kidneys will eliminate the acids and hold back the bases, thus eliminating an acid urine. If there is an excess of bases the kidneys will eliminate the alkaline phosphates and yield an alkaline urine.

The best example of this occurs when we give bicarbonate of soda to a normal individual—*i.e.*, with 4 gm. the urine should become alkaline in a relatively short time. If we give this amount to a case of acidosis the urine remains strongly acid. Advantage was taken of this fact by Sellards, who used it as a test for acidosis. He gave 4 gm. of bicarbonate of soda, and if the urine became alkaline acidosis was eliminated.

This test is perfectly satisfactory for normal individuals, but in cases of acidosis very often the kidneys are diseased, and therefore before the urine becomes alkaline the blood carbon dioxide may reach figures far above 70 vol. per cent; in fact the carbon dioxide may reach an amount above 100 vol. per cent.

Cases have been reported in which tetany has developed because of the alkalosis which resulted from giving a great excess of sodium bicarbonate, before the urine became alkaline. It is for this reason that it is advisable to make frequent carbon dioxide determinations of the blood when using bicarbonate therapy. The function of the kidneys to help maintain a constant C_h of blood is the reason for the marked variation of the C_h of the urine, and also for the variation of the titratable acidity. This variation depends upon the food intake and the rate of metabolism. By

the titratable acidity is meant the amount in Cc. of N/10 sodium hydroxide necessary to bring a known amount of urine to the neutral point. In cases of acidosis the titratable acidity is considerably increased above the normal, the normal varying from 200 to 600 Cc. N/10 sodium hydroxide for twenty-four hours.

The ammonia which results from the breaking down of the amino acids also aids in maintaining the constant reaction of the blood. Protein foodstuffs are broken down to amino acids in the intestinal tract and enter the blood stream as such; the body cells remove those which they require, while the excess are diaminized in the liver and muscles. One of the products of this diaminization is ammonia. Ammonia unites with H_2CO_3 to form urea, while a small per cent unites with other acids. A normal individual eliminates 0.2 to 0.5 gm. of loosely combined ammonia nitrogen in the urine. In an acidosis resulting from the introduction of the foreign acids into the blood stream, such as betaoxybutyric, the ammonia elimination in the urine increased in proportion to the amount of acid found because of the affinity of the ammonia for the foreign acids. About 1 gm. of the ammonia nitrogen is eliminated for every 6 gm. of the betaoxybutyric acid eliminated.

The urinary ammonia is influenced by giving alkali, particularly so in the acidosis of diabetes. In the severe acidosis of diabetes the ammonia output will be high, the blood carbon dioxide low, and large amounts of ketones will be found in the urine and blood. If these patients are then put upon sufficiently large doses of sodium bicarbonate the blood carbon dioxide may be raised to normal, the urinary ammonia reduced to normal, but the ketone output will continue in large quantities, and if the patient is in coma he will most probably die in spite of the fact that the blood bicarbonate has been raised to normal and ammonia lowered to normal.

Finally a few words about acidosis from the clinical view-point.

Acidosis may be divided into two chief types:

1. That which results from the failure of the kidneys to eliminate the acids which normally are eliminated—a retention acidosis. It is found in advanced nephritis, particularly advanced glomerular nephritis. In this type we find a low alveolar carbon dioxide tension, a low blood carbon dioxide, and a normal urinary ammonia. The low ammonia occurs because the acids retained are weak acids such as the acid phosphates, which can act as buffers. This phosphate retention type of the acidosis also occurs in young children.

The other type of acidosis is that which results from the incomplete combustion of fat due either to insufficient food intake as in starvation, or the inability to utilize carbohydrate, *i.e.*, diabetes. As you know, carbohydrate is necessary for the combustion of fat, and if there is an alteration in the carbohydrate metabolism some of the fats are not completely burned. The products of this incomplete combustion are betaoxybutyric acid and its lower products diacetic acid and acetone. This type of acidosis is found in diabetes, starvation, cyclic vomiting, and under-nutrition of all types.

We may also have other types not included in the above groups, such as the acidosis of shock, due either to severe hemorrhage or the blood becoming stagnant in the capillaries. This type has been studied thoroughly by Cannon and his coworkers during the recent war. There is also a reduction of the blood carbon dioxide following etherization, the cause of which is still a debated question. A mild acidosis is often found in acute infections, eclampsia, cardiac decompensation, etc.

EDITORIAL.

SOME FACTS IN REGARD TO THE TREATMENT OF MALARIA.

Readers of the THERAPEUTIC GAZETTE will recall that during 1918 we published a number of editorials which dealt with important phases of this subject. In many portions of the world there is no theme of greater interest and importance to medical men, and, therefore, we deem it our duty, when opportunity arises, to call attention to notable communications upon this subject which appear in home and foreign journals.

The world war which has scattered the Anglo-Saxon race all over the world in numbers far in excess of those of previous times has brought its harvest of malarial infection and enabled many capable men to study the conditions arising therefrom in a manner which has been hitherto impossible.

At a meeting of the Medical Society of London in November last, a number of English clinicians made valuable contributions to this subject. James began by pointing out certain statistical facts which are not suitable to a journal dealing with therapeutics, but he well points out in addition the great difficulty of exercising more than a small amount of supervision over patients who are infected, particularly when they are no longer under military control. Many of these patients, even if they do not present active malarial manifestations themselves, nevertheless harbor the infection and are sources of danger to those who have not been similarly exposed in tropical regions.

In some instances, too, quinine has been administered in such a way as not to have been efficient, with the result that the patient has lost confidence in it and fails to follow out orders. Indeed, this failure is an important factor in impairing the value of all statistics which can be gathered in regard to the efficiency of quinine.

In our earlier editorials at various times we have discussed the differences of opinion which exist as to intramuscular and intravenous injections of quinine in malaria. It will be remembered that East Indian practitioners have been, or are, divided into two schools: one school condemns the intramuscular injection on the ground that it is prone to induce tetanus; the other asserts that if proper precautions are used this calamity never occurs, and denies that the injection is sufficiently painful in its results to militate against its use.

Newton Pitt, in the discussion to which we refer, stated that he regarded the intravenous injection as a simple and valuable method of administering quinine, which was seldom employed, and that the fear of tetanus by such injection was unfounded, although this fear had led to its disapproval by the army authorities in India. He denies that a large amount of fluid must be injected and that this method must be reserved for only severe cases, and points out that Thomson and others have shown that 12 to 15 grains of quinine in 5 to 10 Cc. of fluid have been injected in some thousands of cases with no ill result. This experience is in accord with that of a number of surgeons in the United States navy whose reports upon the use of quinine have already been referred to in these pages. Thus McLean and Michael have emphasized the value of its use among American sailors.

The advantages of the intravenous injection are that it is more efficient in killing the parasite, we are sure of the drug acting, and it may destroy parasites which have become immune to the slowly absorbed doses administered by the mouth.

In the Second London General Hospital relapsing cases now receive a weekly intravenous injection, fortified by 10 grains of quinine three times a day by the mouth. A stock solution of the bihydrochloride four grains to each Cc. is kept for use, and this is diluted when used so that 3 Cc. of the stock solution is added to 15 Cc. of warm sterile saline, which is injected slowly with a small needle. The patient is required to

keep quiet for an hour, or to remain in bed if the temperature is not normal. Pitt states that the procedure is painless and much preferred by patients to intramuscular injections. He also claims that in any cases of blackwater fever with abundant parasites in the blood when the urine is not very scanty, the patient quickly clears up after one or two injections. This, of course, is in contradiction to the opinion of many others who are inclined to the view that quinine may produce blackwater fever.

Castellani is a very firm believer in the efficiency of quinine, and also believes that 30 grains daily, and even 45, and occasionally 60, grains are essential. Indeed he administers as much as 8 to 10 grains daily to a child one year of age. He believes that quinine should be given by the mouth in ordinary cases, intramuscularly in severe cases, and both intramuscularly and intravenously in pernicious cases. He insists that the intramuscular injections must be made only after thorough disinfection of the skin and the greatest care in regard to the asepsis of the solution, which should be sent in deep. He is not much in favor of the idea that idiosyncrasy to quinine is common, and he has also found that methylene blue is useful in cases in which quinine cannot be taken. While believing that arsenic in its older forms is useful in chronic cases, he expressed the view that salvarsan and neosalvarsan have no specific effect.

Continuing the discussion Balfour emphasized the well-known fact that it is important to get the quinine in before the gametocytes are formed, and claimed that the patient at the onset should be kept in bed ten to fourteen days with the idea of treating the patient and not the disease. Balfour, too, expressed the view that the intravenous injections are suitable for hospital treatment, but not otherwise.

Ward expressed the opinion that the chill is not due directly to sporulation, but to toxins which are liberated, and that these toxins affecting many tissues, chiefly the proteins of the blood, cause in turn the development of foreign proteins which produce the symptoms characteristic of the malarial paroxysm. He advocated administering the quinine, not at the time of the chill, but after the patient has begun to recover—that is, the intravenous injection should be given. Attention to diet and strict confinement to bed are also advantageous, and morphine should be used to mitigate the severity of the rigors. He makes it a habit to administer morphine as well as quinine to malarial cases of the active type.

In another communication dealing with this important subject, Carmalt-Jones, speaking of his experience as obtained in Salonica and Mesopotamia, expresses the view that an immense number of persons harboring the parasite must have returned home, and he reported a considerable number of cases in which malaria infection manifested itself in unusual forms, in the circulatory, the respiratory, the excretory, and alimentary systems. The point in his article, however, to which we desire to call particular attention is his quotation of the experience of others who resorted to intravenous injections, giving 20 grains in about 15 ounces of saline solution once a day, or even twice, if the temperature did not fall, accompanying these doses by oral administration. Carmalt-Jones believes that these injections are unsuitable in cases with cardiac and respiratory symptoms, and joins with those who protest against the prophylactic use of quinine lest a strain of immune parasites be developed.

Frazer, from a large experience, expresses views which are also of interest, the more so as he has been the Director of the Institute for Medical Research in the Federated Malay States. In eighteen months no less than 8000 soldiers were sent back to England on account of malaria; many of them in wretched condition. The points which Frazer insists upon are that quinine is used in such a haphazard fashion that failure results and the patients are disheartened. He believes in the great importance of attending to the condition of the alimentary canal for the proper absorption of the quinine, and also that if its full

effect is to be obtained it should be given by the mouth in solution and not in tablets or pills, although of course the fluid form is disagreeable. Not less than 15 grains of quinine a day is the dose which he recommends. Where relapse occurs, he, like the others we have quoted, believes in intravenous injections, and in pernicious cases in doses very much larger than in ordinary cases, particularly when the temperature has fallen—that is, in the sweating stage. He claims that such a patient if not relieved will certainly not have a relapse within four days. He disapproves of the use of quinine at the time of the rigor, as it is prone to produce vomiting and will not stop that attack. In a few cases of blackwater fever that he observed, quinine was withheld while the urine was abnormal, and given freely when this symptom passed away.

This discussion to which we have referred has resulted in a number of communications to the *British Medical Journal* and the *Lancet,* and Willcox, after an experience of three years in Mesopotamia with the Expeditionary Force, is in thorough accord with all others in believing that quinine is the one drug to be given and states that the relative value of quinine bihydrochloride, when given by the rectum, by the mouth, intramuscularly, or intravenously for a given dose, is approximately represented by the figures 1, 2, 20, and 40; or in other words, that five grains given intravenously is equivalent in therapeutic value to 100 grains by the mouth. In his experience the subcutaneous injection of quinine is prone to be followed by sloughing and should be avoided. This does not hold true, however, in intramuscular injections in malignant malaria, or in relapsing malaria, and he thinks that a course of from three to six intravenous or intramuscular injections fortified by oral administrations should be resorted to. In cases of malaria presenting acute cerebral symptoms he asserts that the administration of quinine intravenously is of as much urgency as is the application of surgical measures in cases of fulminating appendicitis, since the delay of a few hours may mean death. The size of his intravenous injection is 10 grains of the bihydrochloride dissolved in 10 Cc. of normal saline, but if collapse is present a pint of normal saline is used. For intramuscular injections he gives 10 to 15 grains in 2.5 Cc. of saline injected deeply in the muscles of the buttock.

Differing from Castellani, Willcox has great respect for idiosyncrasy in regard to quinine, and speaks of one case that developed severe amaurosis after a dose of 10 grains given by the mouth on one day and 15 grains the next. Curiously enough he believes that this toxic effect is more frequent when the drug is given by the mouth than when it is injected by other methods.

Last of all Balfour adds another note of interest in which he points out that injections of adrenalin may be of value in pernicious malaria, which he states has been shown to be associated with an intense infection of the suprarenals whereby the body is deprived of their normal secretion.

THE SAFETY OF CHLORIDE OF ETHYL.

We believe that it is generally admitted throughout the profession that chloride of ethyl is a more dangerous anesthetic than chloroform. Statistics in general seem to indicate that the mortality rate from its use is 1:1600 to 1:2000, and the fact that as it has been employed by a number of surgeons without its becoming very popular would seem to prove that it does not successfully meet the demands that are made upon it. Now and again one meets with a surgeon who is enthusiastic in its employment, but we fear that this enthusiasm rarely lasts long because in all probability some threatened death, or actual death, gives him such a shock that he is afraid of it.

Our readers will be interested in some reports which have been made to the *British Medical Journal* on this subject. Barton, a very well-known professional anesthetist of London, seems to be favorably inclined to chloride of ethyl, but he points out that

Dale, who says that he has never heard of a death from this anesthetic, must have failed to go into the early literature of the subject. While it is true that few deaths from chloride of ethyl seem to have been reported recently, this may be due to the fact that, as it is no longer a new remedy in this field, accidents from its use are not thought to be of sufficient interest to deserve reporting. Barton thinks, however, that the majority of instances in which fatalities occurred previous to 1907 were due to its administration in unsuitable cases. While Dale does not seem familiar with the literature of the subject, nevertheless he claims to have given chloride of ethyl 2000 times a year with no death and no frights.

Ross, of Edinburgh, believes that if it is given by those who are constantly engaged in this branch of work it is reasonably safe. The special field for the employment of ethyl chloride, in Ross's opinion, seems to be operations on the tonsils and adenoids, in which he speaks of it as an "admirable anesthetic." This is surprising, in view of the fact that it is a very fleeting drug and that it has to be given in concentrated vapor so that the ordinary methods of inhalation would fail. Apart from the operations for tonsils and adenoids, he admits that ethyl chloride has to compete with nitrous oxide and oxygen. Indeed, he looks forward to the time when nitrous oxide and oxygen will completely displace ethyl chloride.

Hendrie, another Englishman, says that he has often heard chloride of ethyl referred to as a dangerous anesthetic, but only knows of one death, where he believes the cause was an overdose. He states that he has used it in about 700 cases, and has seen a like number of administrations, and in no instance has been given the slightest cause for anxiety. That it must be given with caution he seems free to admit.

These opinions receive further support from Luke, another English anesthetist, who also expresses surprise that Dale had never heard of a chloride of ethyl death, but nevertheless believes that in trained hands it is by no means a dangerous anesthetic, and he refers to the third edition of a book by himself and Dr. Ross on "Anesthesia in Dental Surgery," in which they compiled a list of 25 casualties under ethyl chloride. However, he believes that all of these deaths were due to a lack of skill and training on the part of the administrator if not to actual carelessness, since some people seem to regard ethyl chloride as a sort of "pocket laughing-gas." Luke makes the interesting statement that in the preparation of the fourth edition of his book since 1910 he and Ross were unable to find any additional records of death. He admits that he can recall several "very bad frights" on his part, largely due to respiratory failure, but states that the insertion of a Mason gag and tongue traction with sometimes artificial respiration restored the patient quickly to the normal. Luke also believes, to use his words, that ethyl chloride is the anesthetic *par excellence* for operations upon adenoids.

He refers to ethyl bromide for this purpose as "nasty stuff," to nitrous oxide anesthesia as being "too slow," and to chloroform as "too dangerous."

Trotter points out that ethyl chloride was discontinued in one of the large hospitals of London about ten years ago on account of a number of fatalities, and does not believe that it is nearly as safe as ether, particularly if the latter is given by the open method, and this is especially true in children, as the closed method is the method of choice in the administration of chloride of ethyl.

As the statistics in favor of ether are many times more favorable than in favor of ethyl chloride we cannot help feeling that the general conclusion of the profession so far in regard to this anesthetic that it is not a safe one for general use is correct.

We are surprised at the statement made by one of the writers, namely, Trotter, that it takes longer to administer it than ether. Our experience has been that the patient goes under more rapidly with ethyl chloride or nitrous oxide than with any other anesthetic that is ever employed, and the recent employment in the war zone of a mixture

of ethyl chloride, chloroform, and ether for the purpose of producing a satisfactory, but fleeting, anesthesia for the dressing of painful wounds, serves to confirm our view that it is speedy in producing its effects and that its chief usefulness in this mixture depends upon the rapidity with which it takes effect; the anesthesia being maintained after its effects begin to pass off by the chloroform and ether, which are more tenacious in their influence.

ANOTHER METHOD OF TREATING SHOCK.

During the war and ever since, and for that matter for many years prior to the war, there has been no subject which has received as much attention from medical writers as shock, which fact indicates that the problem of solving its cause and treatment is not as yet complete.

From the mass of testimony, however, one thing seems to stand out pretty clearly —and this point was generally recognized prior to the war—namely, that the dominant condition is one in which there is great relaxation of the arterial system with accumulation of blood in the great vessels of the abdomen and thorax associated with a low arterial pressure, which is, of course, what one would expect. For this reason many methods have been devised with the hope of being able to restore vascular tone and circulatory equilibrium. Some of them have seemed to be fairly successful, and others, while advantageous as theories, have failed when applied to the human being. Nevertheless the two needs of the patient still seem to be circulatory restoration and maintenance of body temperature.

In this connection we notice the paper with considerable interest which is contributed by Ducastaing to *La Presse Médicale* of December 20, 1919. He reports two cases of shock treated by a method which certainly, at first glance, is diametrically opposed to many of the methods heretofore employed. His theory is that while there may be intense engorgement of the central blood-vessels, this is in large part due to a peripheral vasoconstriction, and for this reason he recommends the employment of inhalations of nitrite of amyl, which most persons would consider was distinctly contraindicated. His first case was that of an artilleryman suffering from shell-shock who was treated twelve hours after his injury by general anesthesia with chloride of ethyl and excision of his wound. In other words, he was subjected to debridement, and afterwards the wound was irrigated with hot salt solution and ether and then irrigation was maintained by Carrel's method. He also received camphorated oil hypodermically. Two hours after this procedure the pupils were dilated and the condition of shock seemed to be severe. He was given an inhalation of nitrite of amyl, with the result that his pulse rose from 40 to 80, and there was considerable improvement in his general condition. Nevertheless at the end of about twenty-four hours the patient died.

In the second case, which was treated in much the same manner, equally good results, so far as immediate results were concerned, were obtained from amyl nitrite, the pulse returning to the wrist and the patient surviving for about four days.

Neither of these cases, of course, is encouraging as to ultimate recovery, but the author is convinced that the patients died as a result of the severity of their injuries and not from shock. He also is sure that a peripheral vasoconstriction is characteristic of this condition, and that nitrite of amyl by relaxing this peripheral state is definitely advantageous.

WASSERMANN REACTION.

One of the evidences of the dominance of the laboratory as opposed to clinical experience is to be found in the trust reposed in the Wassermann reaction in the diagnosis of syphilis. A certain proportion of the profession is still willing to base the diagnosis on the Wassermann. Wassermann positive, syphilis; if strongly positive

this is correct. Wassermann negative, not syphilitic. This is wrong in at least 40 per cent of cases. Moreover, the presence of syphilis does not prove that a particular lesion is syphilitic; and syphilis predisposes to every infection, this being particularly true in tuberculosis. There are some of moderately large experience who because of variations in the report on a given specimen of blood from two or more laboratories are inclined to regard this entire test as of minor importance. Even to-day it is true that if the same specimen of blood be sent to five different laboratories, certainly in weakly positive cases, the reports returned will not illuminate the practitioner's mind in regard to his true diagnosis.

So many articles have appeared pointing out what are claimed to be laboratory errors, due doubtless to difference in technique and lack of standardization, that when one appears which demonstrates technicians working independently of each other arriving at practically the same results, it is worthy of note. Thus Solomon (*Journal of the American Medical Association*, March 20, 1920) reports on 3000 patients who had their blood tested in two laboratories, the patients being bled into two test-tubes at the same sitting. One laboratory used three cholesterinized antigens of different sensitivities, and in addition to the cholesterin antigen employed an acetone insoluble antigen. The percentage of marked variation in these cases was small.

Solomon remarks that it seems only fair to state that a moderately positive or doubtful Wassermann reaction is not sufficient evidence on which to base a diagnosis of syphilis, unless backed by other strong points. It is always advised that in such a case the test be repeated until either a strongly positive or a definitely negative reaction is established. Hence, in considering the possibilities of going wrong in accepting the reactions of one laboratory, one would consider only the cases that are reported as straight positives. As the table indicates, the percentage variations between the two laboratories, considering the straight positives, is only 4, a percentage which he considers exceedingly low, and justifying the technique of these laboratories to a high degree.

If the possibility of making an erroneous diagnosis of syphilis, based on a positive reaction from but one laboratory, is considered, we see that this is reduced greatly, in that the percentage from one laboratory is 1.4, and from the other 2.6. This is stated on the assumption that when one laboratory gives a negative reaction and the other a positive, the positive does not represent syphilis. This is obviously not a correct hypothesis, as we have to deal with cases which are undoubtedly syphilis, but which give negative reactions in one laboratory, due either to the weakness of the antigen, or to a technical error. We, therefore, went over the cases in which this discrepancy occurred, from the clinical standpoint, and considered only those cases in which very definite evidences of syphilis were obtained. This included cases in which the history was absolute, such as patients who had been known to have syphilis and had given a positive Wassermann reaction in the past and had been under treatment, or cases of syphilis of the central nervous system, in which the spinal fluid findings were positive. Many cases highly suggestive of syphilis, from the fact either that the patients were prostitutes or that they had had symptoms on which one would practically be justified in making a diagnosis of syphilis, were considered as not syphilitic, in order not to prejudice the conclusions in favor of the laboratory. Deducting the cases, then, that were undoubtedly syphilitic, we find that of the 3000 cases tested Laboratory A returned twenty-two positive reactions which were reported negative in the same cases by Laboratory B, and which did not give definite evidence of syphilis. This would make a possible "false positive" report (*i.e.*, a positive reaction, due to an error in the performance of the test, on a non-syphilitic serum) in only 0.73 per cent. From Laboratory B this percentage was 2.43. These low percentages are

undoubtedly higher than the facts justify, as there can be no doubt that some of these cases were syphilitic. However, if we accept these figures as the worst possible, they are still such that we can place a great deal of confidence in the reports of the laboratories. This study shows that it is possible to obtain "false negative" or "false positive" reactions. It should be emphasized strongly that these figures as given represent a discrepancy between the two laboratories on the first test. In the majority of cases a uniformity of report was obtained on repetition.

While these figures are exceedingly low, and therefore very satisfactory, it is true that no matter how small the percentage of error may be, if it affects any given individual, it is a 100 per cent error for that individual, and therefore it is the duty of the clinician to protect him as far as is possible. This can be accomplished in a number of ways. Several repetitions of the test giving uniform results are very good evidence that the result as reported is correct. Secondly, having the blood tested by two laboratories simultaneously affords a good check. If there is a discrepancy, that is evidence that one or the other test may be an error, and a repetition of the test is indicated. It should be emphasized that a knowledge of the laboratory and its standards, technique and method of reporting is more important in obtaining the information desired than the reports from a number of laboratories which may not be careful or accurate. In other words, it is the clinician's duty to know the possibility of error in the laboratory that he is using.

An analysis of the results showed that there was a complete uniformity in the findings of the two laboratories in 93.44 per cent. The 6.56 per cent variation included cases reported as doubtful. Considering only the variation of cases reported positive by one laboratory and negative by the other, the percentage variation was 4. This was 1.4 per cent positive by one laboratory and 2.6 per cent positive by the other laboratory. Some of the cases reported positive by one laboratory and negative by the other were known to be syphilitic, so that the negative reaction was the incorrect one. Considering, then, the cases that either laboratory may have reported as positive in non-syphilitic cases, the percentage was 3.16. This is probably a higher percentage for false positives than actually occurred, as some of these cases were presumably syphilitic. This percentage variation is based on only one test. Repetitions resulted in a uniformity of findings in the majority of cases. This is considered a good testimonial for the accuracy of the tests as performed in these two laboratories.

ON THE SURGICAL ASPECT OF DYSENTERY.

Under the term dysentery the profession at large means an ulcerative colitis, other than that attributable to either tuberculosis or spirochetal infection. There are perhaps three forms of this due to the invasion of the bowel by the Entamœba histolytica or to a number of bacilli separable one from the other by culture media. The so-called Shiga and the Flexner are the two most widely known. Cope (*Lancet*, March 13, 1920) has taken up the surgical aspect of dysentery and supplemented his own experiments with knowledge gained from that of others, presenting a paper of more than ordinary interest and value. He notes that the amebic infection leads to infiltration and ulceration of the intestinal wall. The ulcers are usually undermined and often scattered, and sometimes large areas are denuded of mucous membrane, whilst in severe cases of acute, sloughing, amebic dysentery the bowel wall may be so rotten as to merit Roger's apt simile of damp blotting-paper. In bacillary infection ulceration is not so constant a feature, but severe cases are accompanied by extensive sloughing of the mucosa, so that at autopsy there may be no particle of mucous membrane left in the large gut. Fever and toxemia are more common features of the bacillary form of infection.

Perforations are rare, more so in the bacillary than in the amebic forms. When these occur they are usually in the sigmoid colon. The symptoms of perforation do not differ from those distinguishing this condition when due to other causes. The resultant inflammation may be either localized or general.

The distinction between colitis and appendicitis is extremely difficult. In the amebic form the symptoms of acute appendicitis usually disappear very promptly under routine treatment. The appendix may, however, become acutely inflamed and may even perforate.

The dysenteric process is sometimes so acute that large portions of the mucous membrane become necrotic. Sometimes the whole of the mucosa is destroyed, and then a fatal result is the rule. In less virulent cases extensive ulcerative surfaces are left, secondary infection supervenes, and the colon becomes virtually a pus-sac. It is then difficult or impossible to isolate the specific dysenteric bacilli, which indeed seem in most cases to be overshadowed by other bacilli within a few days of onset of the disease.

The patient is often well of his specific dysentery but ill from the ulceration and secondary infection which result from it. In such cases the physician, in addition to specific treatment, helps the evacuation of the toxic intestinal contents by the administration of aperients and by washing out the lower bowel from below.

The general opinion is that surgical measures have no place in the acute or subacute stage. Cotte, however, has recently recorded seven cases in which he performed appendicostomy between the fifteenth and twentieth day of the disease when medical treatment had been of little or no avail. Five of the seven made a good recovery. Cotte washed out the colon with silver nitrate solution, 1 in 1000. In none of his cases did the operation appear to do harm, though it failed to save two patients. In the five successful cases recovery was prompt and permanent. It is hardly wise to draw conclusions from so few cases, though clearly the procedure is not so unreasonable as some have assumed.

In chronic dysentery, especially the bacillary variety, when the sloughs which have come away make it clear that large ulcerating surfaces are present, and the clinical condition of the patient gives evidence that he is being slowly poisoned by the toxins which are being absorbed, the problem is less doubtful. Irregular fever, rapid pulse-rate, anemia, emaciation give the clinical picture which ends in death from asthenia if prompt measures are not taken. Such cases are somewhat similar to those terrible cases of ulcerative colitis which are well known and dreaded by all physicians of experience.

When once it is certain that there are large chronic ulcerating surfaces in the colon, and when symptoms of toxemia are present and do not improve under medical treatment, then surgical measures are imperative.

For providing means for irrigation of colon from above, appendicostomy and valvular cecostomy are suitable. For diversion of the intestinal contents the surgeon must perform open cecostomy or enterostomy, or ileosigmoidostomy.

Appendicostomy has met with a considerable amount of success. The appendix is brought up to the abdominal wall, part of it is removed, but about an inch is left into which a rubber catheter is inserted, and through this the colon can be irrigated. Sometimes the appendix may be adherent, or difficult to find, or diseased, and then cecostomy by the valvular method of Gibson is indicated. Valvular cecostomy is probably preferable in most cases. By irrigating the colon through the opening it is possible to avoid stagnation of poisonous products with consequent toxemia. The operation usually fulfils its purpose, though it is necessary to continue irrigation daily for months till the ulcerative surfaces have had time to heal. The condition may relapse if the opening be allowed to close too soon.

So far as the limited but collective experience enables the author to judge he

would conclude that for the colonic pus-sac of chronic dysentery, or for any chronic toxemic ulcerative colitis, appendicostomy or valvular cecostomy should first be tried, and if no improvement occurred after irrigation an open cecostomy or, better still, enterostomy with complete division of the small gut would be advisable. Lateral anastomosis whilst the colitis is still active would hardly be a wise procedure.

REPORTS ON THERAPEUTIC PROGRESS.

THE RADIOGRAPHIC STUDY OF THE ABDOMINAL ORGANS AFTER INFLATION OF THE PERITONEAL CAVITY.

ALVAREZ, in the *California State Journal of Medicine* for February, 1920, reminds us that any part of the body may be made visible under the Roentgen rays if we can only make its degree of resistance to the passage of those rays different from that of the surrounding tissues. We may make it more resistant by injecting suspensions of barium or we may make it less resistant by injecting air. Many have used air or oxygen in radiographing the bladder, colon, stomach, and knee-joints. Recently oxygen has been used to outline the cerebral sinuses. For a number of years the German radiologists have been experimenting with the injection of air or oxygen into the peritoneal cavity. Lorey in 1912 seems to have been the first to show radiographs taken after injecting air into the abdomen of a patient who had been tapped for ascites. A great deal of credit should be given to Weber, who began in 1912 to work out this technique on animals and cadavers. His published plates are excellent, and it is surprising that his epoch-making article in a widely read journal should have been so completely ignored and forgotten by the profession.

Although a few papers appeared on the subject in the next few years, it was not until 1918 that the men in Europe seemed to wake up to the possibilities of this method of diagnosis. While in the East last June Alvarez saw some beautiful plates taken with this method by Stein and Stewart. These impressed him so much that immediately upon his return to San Francisco he began experimenting on animals to satisfy himself of the harmlessness of the procedure, and later to see if he could modify it so that it would be more convenient for use at the office. Its harmlessness in suitable cases seems to have been well established, as no accidents have been reported from the clinics in which it has been used extensively. Rabbits and guinea-pigs can be distended with oxygen or CO_2 to a degree not approachable in man, without producing any signs of distress or concern. Strange to say the rapid absorption of these large quantities of gas does not bother their respiratory centers.

The more Alvarez works with this method on man the more enthusiastic he becomes, and the more convinced that we have the greatest advance in radiologic technique since the introduction of the bismuth meal by Cannon in 1898.

The patient ordinarily should have the bowel and stomach empty. In certain cases, however, good results are obtained by having the bowel filled with barium. He believes it advisable to give the patients a quarter of a grain of morphine hypodermically fifteen minutes before the injection because otherwise some will be very restless and will complain of pain. Nervous women will be quieted by the sedative and will be less likely to get panicky if they feel faint and oppressed about the heart. Some of the more phlegmatic individuals do not seem to feel much distress and complain only about the abdominal distention.

He uses a spinal puncture needle which is thrust through the left rectus muscle near the navel. The skin is painted with a little iodine. No anesthetic is needed. With a little practice one can tell when the point of the needle goes through the peritoneum.

He generally injects first a little sterile normal salt solution to make sure that the needle is clear and properly placed. It then is connected with a small rubber bag which contains a liter or two of gas. There appears to be no need for sterilizing or washing this gas. Experiments on animals and all the experience on man indicate that, with ordinary care, there is no danger of damaging the bowel with the needle. The amount of gas injected depends on the feelings of the patient. A compromise often has to be made between the desire of the radiographer to get good plates by the injection of large amounts and the desire of the patient to be let off easy. When enough has been introduced, the needle is removed and the work of taking plates is begun. If possible the patients should be kept lying down until their gas has been absorbed or until they are comfortable again. When they sit up, the pain in the shoulders becomes acute and they may feel as if they were going to collapse. Strange to say, after an hour or two they may be able to walk around quite comfortably, although it can be seen with the screen that the liver is four inches or more below the diaphragm. Very satisfactory plates can be taken with the patient prone. Particularly when the gall-bladder region is raised a little on the inclined plane which is used in taking frontal sinuses, the liver and kidney shadows are separated, and beautifully distinct. The gall-bladder can be shown better with this technique than with any other, and there no longer is any need for catheterizing the right ureter when we want to tell whether a stone shadow is in the gall-bladder or in the pelvis of the kidney. Adhesions to the gall-bladder may also be shown very clearly.

Stereoscopic plates taken in the prone position are beautiful, and will show the liver, spleen and kidneys in all their outlines as clearly as if they were exposed by dissection. With the patient first on one side and then on the other, the diaphragm stands out as a thin line on the plate. The lower ribs show so clearly that no difficulty need be encountered in showing old fracture lines. The upper surface of the liver can be seen perfectly, so that adhesions, cirrhotic deformities and syphilitic or carcinomatous nodules can be recognized. Peritoneal adhesions, tumors of the colon and small amounts of ascitic fluid may also be seen. The stomach may be inflated a little, whereupon its walls can be studied. The relations of tumors to surrounding organs may become clear. In the Trendelenburg position the uterus and even the ovaries may be visualized. In one of Dr. Stein's plates one can see cysts in the ovaries. Adhesions to the anterior abdominal wall can be shown by taking a lateral plate with the patient on his back. Lesions of the spine and aneurisms of the abdominal aorta can be demonstrated clearly when they are present. Occasionally one can see calcified mesenteric glands.

After working with this technique for a few days it seemed to Alvarez that its usefulness would have to remain limited largely to hospital patients unless some means could be found of getting rid of the gas more promptly. Although in most cases the oxygen was sufficiently absorbed in two or three hours so that the patient could leave the office, few cared to work next day; and one man still had a large amount of gas in his abdomen after five days. Hence Taylor and he began injecting rabbits at the Hooper Foundation with various gases and soon found, as they had expected, that CO_2 would be absorbed many times faster than oxygen. After satisfying themselves that the procedure was harmless, they began using CO_2 at the office and have since made it almost a routine. The great advantage of this method is that the patient can be assured that in twenty-five minutes his gas will be out, his distress will be over, and he can go back to his work as if nothing had happened. The disadvantage is that the operator must work rapidly if he is going to get all the plates he wants. Moreover, if a plate should be unsatisfactory for any reason, or if on development something should be found which requires further study, it may be too late. Alvarez overcomes this difficulty somewhat by having three people working rapidly; one develop-

ing as fast as the plates are taken. It may be that by adding a little oxygen we can slow the emptying a little and yet retain the great advantages which have been gained with the new technique.

THE INTRAVENOUS ADMINISTRATION OF MERCURIC IODIDE IN THE TREATMENT OF SYPHILIS.

In the *Lancet* of February 14, 1920, SPITTEL reports a method of administering mercury and iodide which he has found superior to any other. When, at the beginning of the war, there was a likelihood of a shortage of salvarsan, he experimented with arsenic, mercury, and iodide, taking as his working hypothesis dosage to the point of tolerance by the intravenous route. An experience of over 4000 of these injections, during a period of four years, convinces him that the solution here advocated has only to be given a trial for its worth to be established. It is a valuable adjunct to the treatment of syphilis with salvarsan; the combination establishing a cure (as gauged by Wassermann tests, provocative and otherwise, at varying intervals) more quickly and permanently than by any other method he knows.

The solution has the following composition:

Mercuric iodide, 50 gr. (3.24 g.);
Sodium (or potassium) iodide, 8 dr. (28.42 g.);
Phenolphthalein (0.5 p. c. solution), 20 min. (1 Cc.);
Sodium hydrate (25 p. c. solution), about 2 dr. (8 Cc.);
Distilled water, to 40 oz. (1000 Cc.).

Before the addition of sodium hydrate the solution is acid; it has to be rendered slightly alkaline; the phenolphthalein it contains is both an index of correct alkalinity and a coloring agent. The sodium hydrate should be added last and gradually; once the neutral point is reached it is put in drop by drop until a brilliant and clear pink color is obtained. The solution keeps indefinitely, and when prepared under aseptic precautions and stored in a glass-stoppered bottle is always ready for use. If kept too long it tends to become decolorized (probably from the presence of hydriodic acid); the addition then of a few drops of the sodium hydrate solution quickly restores the necessary alkalinity and color.

The dose for an adult is 8 to 12 Cc. given intravenously with a 20-Cc. or, better, a 30-Cc. syringe. The required dose is filtered off through aseptic cotton-wool and drawn into the syringe, which is then filled to its full capacity with strained sterile or distilled water. This further dilution, with at least an equal quantity of water, preferably more, is necessary to prevent pain and thickening of the vein; a 30-Cc. syringe is therefore necessary for the larger doses. Should any of the solution escape into the tissues outside the vein a tender induration results, as with salvarsan. Unless exceptionally well borne a dose of 12 Cc. need not be exceeded.

The injection is tolerated well. Heavy doses may cause chill, fever, malaise, and abdominal pains with diarrhea (sometimes bloody), and griping; but there is scarcely any reaction when an initial dose of 7 or 8 Cc. is given and gradually increased by 1 or 2 Cc. at a time, according to tolerance. Gingivitis and salivation give the clue to quantity. Heart and kidney disease need not stand in the way of careful dosage.

The rapidity with which these injections cause the disappearance of syphilitic lesions is indeed gratifying; the results are not only far quicker than those obtained with mercury and iodides given by any other methods, but often even a single injection produces an effect almost as phenomenal as salvarsan. In nerve syphilis especially some of the finest results are obtained; this is not to be wondered at when the absorptive action of the iodides is remembered.

The number of injections and the interval between them vary, of course, with the particular case. An ordinary case of secondary syphilis may be treated with five or six injections each of salvarsan and mercuric iodide, given at intervals of from seven to ten days alternately, in varying sequence or in successive courses. Often after such a series a negative Wassermann reaction is permanently obtained; if not, further courses are given to meet particular needs.

Syphilis is not a disease with which any risk should be taken; and our knowledge of blood reactions not being final, it is hardly prudent to pin our entire faith on their infallibility. It is well, therefore, to safeguard the patient by prescribing mercurial treatment by mouth or inunction (measures which have the advantage that the patient can carry them out at home) for periods varying from eight to twelve months, according to the demands of the case.

Some such routine course as the following may be begun from the day the patient comes for advice, and be carried through despite the injections. Mercury, in the form of gray powder, is to be taken for six weeks; this is followed by an interval of one month, in the middle ten days of which an iodide mixture is given, *e.g.:*

℞ Potassii iodidi, 5 to 20 gr.;
Liq. arsenicalis, 4 mins.;
Extr. sarsæ fl., 1 dr.;
Syrup. glycerophosph. co., 1 dr.;
Infus. cinchonæ, q. s. ad f℥js.

Sig.: To be taken in a glass of milk or water twice a day.

These oral courses of mercury and iodide are to be continued for about a year.

CAN ARSPHENAMINE BE KEPT IN A PERMANENT SOLUTION?

Lowy, in the *Journal of the Medical Society of New Jersey* for May, 1920, answers this question in these words:

1. Solutions of arsphenamine as prepared by him have remained apparently unchanged for five months and passed toxicity tests of his own and two other laboratories. (The United States Public Health Service Hygienic Laboratory has tested preparations which have been in their possession since July 19, 1919.)

2. Clinical tests have shown that it is non-toxic and apparently does not give more reaction than those that occur with freshly prepared solutions.

3. The advantages of this form of arsphenamine require little explanation. The average physician has neither the facilities nor the time to prepare arsphenamine.

4. Further experiments are being conducted in collaboration with the Hygienic Laboratory to determine the rate of deterioration, if any.

Since writing this report over 2000 injections have been given at various clinics with comparatively few reactions. The solution has also received the approval of the United States Public Health Service and of the Council on Pharmacy and Chemistry of the American Medical Association.

EARLY RECOGNITION AND TREATMENT OF INTUSSUSCEPTION.

Krause, in the *Illinois Medical Journal* for February, 1920, strongly emphasizes the dangers of delay, and does not recommend attempting reduction by medical treatment. He believes that with modern aseptic technique, the certainty of reduction and the more probable prevention of recurrence after surgical intervention should make us hesitate to attempt reduction by medical methods.

Among the disadvantages of non-operative treatment there is first the danger of rupture of the bowel with consequent peritonitis. This perhaps is slight, but should be considered. In the next place one is not always sure that reduction has actually been accomplished. Third, there is a frequent recurrence of intussusception, and opiates, which tend to mask the symptoms, offer the only preventive.

Surgical treatment offers some distinct advantages: the first being that one is sure either of accomplishing reduction, or if necessary more radical measures may be undertaken; second, a recurrence can more certainly be prevented by stitching the reduced gut to the peritoneum or shortening the mesentery; third, before relieving an intussusception in those cases of marked toxicity, one should aspirate the distended gut above, because as soon as this poisonous material strikes the normal intestine below it is absorbed much more rapidly and floods the system with toxin. He does not believe that this procedure is necessary, excepting in those cases of more than thirty-six hours'

duration, because the material as a rule is not very toxic in the early cases.

He would therefore advise operative treatment in every case of intussusception as soon as the diagnosis has been made, and not wait for a sausage-shaped tumor to be present to make a diagnosis. His object in presenting this paper has been to urge upon the medical profession the necessity of early diagnosis and treatment, if we wish to prevent the extremely high mortality certain to occur in all neglected cases.

HYPERESTHETIC ETHMOIDITIS.

In the *Illinois Medical Journal* for February, 1920, POLLOCK states that the diagnosis of hyperesthetic ethmoiditis is comparatively simple when once the condition is in full force: an intensive violent sneezing attack, followed by a profuse hydrorrhea, a thin, watery, burning secretion, which may persist from several minutes to several hours, a blocking of the nose, profuse lacrymation and itching of the eyes. These violent symptoms may suddenly abate, and the patient feels fairly free from all symptoms until the succeeding day, when they are repeated. It simulates very closely the attacks of hay-fever, except that, in the latter, usually after a sudden onset there is no sudden abatement of the symptoms. There are repeated attacks at any time of the year, especially if brought in contact with the special exciting cause, such as perfume, dust, powder, etc. The diagnosis is further verified by inspection of the nose. The extreme paleness and succulent condition of the turbinates and of all the mucous membrane of the nose is pathognomonic of this symptom-complex. This syndrome must be differentiated from hyperplastic ethmoiditis, in which condition we frequently get symptoms of sneezing and hydrorrhea. In this latter condition we have distinct pathology of the mucous membrane and the turbinates which has been described by Beck. There is usually a polypoid degeneration of the turbinates or true polyps; also associated headaches, asthma, etc., but never the succulent pale turbinates, which are found in hyperesthetic ethmoiditis. We must also differentiate the symptoms from true hay-fever, but the latter condition is so characteristic in its time of appearance and presents such distinctive symptomatology that it is needless to emphasize the differentiation of the two conditions. In cases of meningocele there is often an escape of the cerebrospinal fluid, which, of course, must be differentiated from the hydrorrhea accompanying hyperesthetic ethmoiditis; also from hydrorrhea and turgescence described by Fein in connection with sexual excesses and irritation.

The prognosis without intervention is bad, as the attacks invariably return, and, while they do not seriously undermine the general health of the individual, they cause a great deal of anoyance and discomfort. With the proper treatment the prognosis is good, and nearly every case will respond to the treatment. The spontaneous attacks will not occur, the paroxysms only recurring after violent contact with or inhalation of the irritating substance, and then they are mild in character, short in duration, and very little of the concomitant symptoms are present.

In a paper which Pollock published four years ago he advised the injections of the sphenopalatine ganglion as a cure for this syndrome, stating that he obtained positive results in nearly every case thus injected. That report was given out several months after the various injections had been performed; since then he has had a few recurrences in these injected cases.

The procedure is quite simple, and he still believes it is worthy of a trial in all cases except where the economic conditions prevent its being attempted. By this he means that if the patient comes from a distance to obtain relief and desires a permanent relief, without much chance of recurrence, he believes it is better to proceed to the more radical treatment, *i.e.*, bilateral ethmoid exenteration.

There is no special method of performing this operation, but it is very important that a complete exenteration be done, either with or without the removal of the middle turbi-

nate. He prefers to remove the turbinate at the same time, unless there is some special contraindication. In other words, when the patient presents himself with the typical symptoms of a hyperesthetic ethmoiditis and the diagnosis is made, we wait until the acute attack has subsided and then proceed with the treatment.

The sphenopalatine injection is performed in the following manner: The posterior end of the middle turbinate and the mucous membrane behind same are thoroughly cocainized with a twenty-per-cent solution. The hollow sword needle of Sluder, which is a straight needle 5¼ inches long with a cross-bar near the end, is then introduced from the septal side of the nose and the posterior end of the middle turbinate is transfixed. The needle is then pushed upward, backward, and outward, through the bony wall, which is the anterior boundary of the sphenomaxillary fossa in which the ganglion lies surrounded by connective tissue. A 5-Cc. Luer syringe, filled with a one-per-cent phenol in ninety-five-per-cent alcohol, is attached to the hollow needle and a few drops, 5 to 15, are injected. Often the bony wall is so thick that it is necessary to employ the mallet to drive it through.

In the great majority of cases this prevents subsequent attacks, but, as stated before, if attacks recur, the exenteration must be resorted to.

RESTORATION OF THE FROG'S HEART IN CHLOROFORM POISONING.

In the *Journal of Pharmacology and Experimental Therapeutics* for January, 1920, RANSOM states it is shown in perfusion experiments that frogs' hearts depressed by chloroform may be restored to nearly or in some cases quite normal activity by adding to the chloroform solution small quantities of adrenalin, tyramine, strophanthus, diuretine, caffeine, or strontium chloride (pituitrin failed). In the case of adrenalin and tyramine the restored hearts will continue beating well in presence of toxic amounts of chloroform for some hours. The other substances when added to the chloroform solution cause, first, restoration and then characteristic toxic symptoms of their own, but this latter difficulty may be got over if, as soon as restoration has taken place, the perfusion fluid is changed to plain Ringer's solution. By this method of giving a small quantity of the antagonist and following with plain Ringer's solution, restoration is much quicker than when the chloroform is simply washed away.

It must be borne in mind that the antagonism shown in these experiments applies only to the effect of chloroform upon the heart muscle, and that in order to be effectively used the antagonist must reach the heart. In so far as these results, obtained in certain experimental conditions with frogs' hearts, are applicable to warm-blooded animals they indicate the importance of detecting early symptoms of heart failure under chloroform—an injection of a suitable antagonist made at once would probably be successful, delay till failure had actually occurred might be fatal.

[Other experiments seem to show that adrenalin increases the danger of fibrillation in warm-blooded animals under chloroform. —Ed.]

STUDIES OF THE CEREBROSPINAL FLUID.

BECHT, in the *American Journal of Physiology* for February, 1920, reaches these conclusions:

1. The manometer method is superior to the outflow method as a means for studying the cerebrospinal fluid.

2. It is essential that arterial, venous and fluid pressures be measured simultaneously and continuously, if trustworthy evidence regarding the mechanism of fluid formation is to be obtained.

3. Venous and fluid pressures, while positive in normal animals, are always less than arterial pressure. Venous and fluid pressures are almost but not exactly equal; no law can be given in regard to which is under the greater pressure.

4. Venous and fluid pressure vary in the

same direction, and to some degree proportionately in nearly every case; these pressures may or may not vary in the same direction as the arterial pressure.

5. Raising the venous pressure raises the fluid pressure; lowering the venous pressure lowers the fluid pressure. Therefore the measurement of the venous pressure is absolutely necessary to rule out venous pressure changes, where the study of the fluid is under consideration.

6. Increasing or decreasing the fluid pressure moderately does not alter the venous pressure unless the arterial pressure is affected.

7. Ligation of the arteries entering the circle of Willis produces only passive changes in the skull characterized by a fall in the arterial, venous and fluid pressures, with almost perfect readjustment when the vessels are released.

8. Ligation of arteries in other parts of the body produces only mechanical changes.

9. The administration of adrenalin produces purely passive changes in the fluid pressure, although rapid outflow follows such an injection if the outflow method of study is employed. The fact that ligation of the jugulars does not modify the results, either as regards the form or the duration of the curves of pressure change, is additional evidence that there is no new formation.

10. Arterial pressure can modify the fluid pressure independent of the venous pressure.

11. The fluid pressure is the result of at least two factors: the influence of the venous pressure, plus the influence of the arterial pressure. Thus the fluid pressure in some animals will be higher than the venous pressure.

12. The effect of the peripheral vagus upon the fluid pressure is exactly what is to be expected, if the changes are due to mechanical causes. Increased secretion due to asphyxia need not be assumed to explain the results.

13. The greater the amount of fluid there is in the canal the more nearly does the fluid rise and fall equal the venous rise and fall following adrenalin; hence the animal with a large amount of fluid in the canal will show greater alterations in the fluid pressure during an experiment.

14. Increasing the active respiratory movements by stimulation of a sensory nerve like the sciatic produces the changes in the fluid pressure to be expected from the changes in arterial and venous pressure. The same stimulation may produce either increased or decreased outflow of fluid, with the former the more common.

15. Inhibiting the respiratory movements by stimulation of the superior laryngeal or the central vagus raises the fluid pressure; but this rise is adequately explained by the changes in the arterial and venous pressures.

16. The increased outflow of fluid observed during asphyxia is adequately explained by the rise in the arterial and venous pressures.

17. Becht was unable to reach any conclusions regarding the normal rate of the formation of the cerebrospinal fluid.

18. Adrenalin and nicotine are not absorbed from the canal rapidly enough to produce the characteristic effect upon the blood-pressure.

19. Adrenalin can be detected in the canal for at least five hours after its injection.

20. Adrenalin is more rapidly destroyed *in vitro* by cerebrospinal fluid than by blood. A peculiarity in the reaction is seen in the fact that small quantities of the fluid, whether diluted or not, destroy adrenalin in solution more rapidly than do larger quantities of the fluid. This "protective action" of the larger quantity, but not the destructive principle, is destroyed by heating the fluid to 65°-75° for thirty minutes.

21. Secretin has no effect upon the pancreas when injected intradurally.

22. The effect of pilocarpine, when injected intravenously, upon the fluid can be explained logically by the effect of the drug upon the arterial and venous pressure in the skull. The same holds true for nicotine and arecoline.

23. The effect of atropine upon the fluid pressure can be explained logically by the

effect of the drug upon the arterial and venous pressure in the skull.

24. Amyl nitrite always (twenty-one consecutive trials) produces a fall of the fluid venous and arterial pressures. The increased outflow of fluid, occasionally but by no means always observed, is due either to the accumulation at the expense of the fluid of venous blood in the sinuses with decreased venous pressure, or is due to the increased facility with which fluid passes into the region of the fourth ventricle from distant parts of the nervous sysem.

25. All the changes in the fluid pressure and fluid outflow which have been offered as proof of the secretory mechanism of formation of the cerebrospinal fluids can be traced to alterations in venous and arterial pressures in the skull. There is no proof that the fluid is formed by secretion.

THE PRESENT-DAY ATTITUDE TOWARD THE SCIENCE OF THERAPEUTICS.

THALER, in the *Journal of the Missouri State Medical Association* for March, 1920, states that the man who enters a medical school with the object of attaining an M.D. degree has surely not determined beforehand that he will become an internist, a surgeon, or a specialist in some other field of medical endeavor. He has before him presumably a vision of becoming primarily at least an adept in the art of medicine, sufficiently so to meet disease and combat it with the full force of the armamentarium which the medical school has presumably placed in his hands.

In most medical schools of proper standing to-day the student receives an excellent training in the major studies, anatomy, chemistry, pathology, physiology, and their associate branches. Pharmacology receives more or less attention in proportion to the ideals of that particular medical school, and in most instances—according to catalogues—resolves itself to experiments involving a few and select drugs on quadruped mammals. Nearly all schools offer a smattering of the special fields of medical endeavor with a certain amount of surgery and usually a good all-round course in general medicine. Therapeutics, which is in reality, the acme, in fact the *modus operandi*, of the graduated student's medical efforts, is given on an average of one or two trimesters, or at best, semesters, in most medical schools of the United States for a two- or three-hour week.

In this connection he states that the data offered throughout his paper was gleaned from catalogues of medical schools accredited as being the leading ones in the United States of America. They include Jefferson, Johns Hopkins, Rush, Yale, Cornell, Leland Stanford, Washington University, St. Louis University, and several others. The Jefferson Medical School is the only medical school in the United States that considers therapeutics of sufficient worth in its medical curriculum to offer 279 hours during the four scholastic years, under the heading of materia medica and therapeutics. In sharp and unfortunate contrast with this stands out the time devoted to therapeutics in the two medical schools in St. Louis. The Washington University Medical School offers twenty-two hours in therapeutics and the St. Louis University Medical School offers thirty-two hours. Harvard ignores the study entirely as a distinct subject.

The result becomes easily and uncomfortably evident. The student of even our highest standardized medical schools has studied for an average of forty to fifty hours of a two- or three-hour week the most important drugs in the Pharmacopœia. The majority of these drugs he has never seen, and in all probability will never become conversant with their physical properties, except regarding that which he has heard of them in a didactic way and from the few select drugs which he has handled in the pharmacologic laboratory.

One can readily assume now why it is that the average physician, on being questioned by a patient as to the character of the prescription which he has ordered, must needs summon a good deal of *sang froid* which he does not feel, and appear very sapient, but he does not desire to affect the

sensibilities of his audience by the mention of actual anecdotes relating to ludicrous mistakes made by graduates of our very highest schools, evidencing a lack of knowledge of even the commoner and best known drugs during his experience as a pharmacist.

When by force of circumstances the newly made M.D. is hurled into the whirlpool of general practice and finds himself confronted by conditions and symptoms-complex which his medical training may well make him able to diagnose, yet on attempting to meet these very conditions by proper medication or other therapeutic measures he is suddenly confronted by the fact that on account of the meager information he received in that branch of medicine he has in most instances forgotten the greatest part of the subject. And as for constituents and dosage of drugs with which he might desire to proceed against conditions, the nebular hypothesis of Swedenborg is probably more definite and tangible to him at the moment. In fine, it is no secret that the mind of the young physician is in a bewildered maze when he attempts to select from Nature's great laboratory two or three substances to utilize for a given case which he is called on to meet himself. If he is a sapient individual he will usually seek the abstruse assistance of an abridged manual of therapeutics tactfully hidden in a generous sized pocket.

It is felt that the attitude toward therapeutics is one of the fallacies of medical education to-day, and is a potent factor in causing the average newly graduated physician to make a speedy exit from the realm of general practice and seek some specialty; hence the overcrowding of the special fields in medicine. In other words, the medical school has failed to make of the physician a master of the very tools with which he is supposed to be equipped. Small wonder is it, then, that the laity, which is only too critical and discerning, has become cynical and pessimistic anent the prowess of the young physician. No doubt every physician is familiar with the trite axiom from the layman denoting fear of the young physician's prescription, and there is little doubt but what a great deal of harm has accrued to the profession as a whole on account of this very attitude of the laity.

While there is little need for apology in uttering what even to the casually trained observer is an evident truth, Thaler craves indulgence for making the following unvarnished statement, to wit: that the graduate of a Class A school of pharmacy, such as is represented by the St. Louis College of Pharmacy, attaining the Ph.G. degree, is better able and qualified to administer the proper medication where the diagnosis has been made for him than the average graduate of any medical school in the United States of America, barring the Jefferson Medical College, which, as has been stated before, devotes 279 hours to therapeutics during the four years in medicine. In order to lend weight to the above extreme assertion, he states that this conclusion has been reached after an observation extending over a period of twelve years as an active pharmacist and over ten years in the general pursuit of medicine.

THE SPECIFIC DIAGNOSIS AND TREATMENT OF ACUTE LOBAR PNEUMONIA.

In the *Boston Medical and Surgical Journal* of February 26, 1920, SPOONER states it would appear that the small percentage of cases in which polyvalent serum can be of service and the relatively large amount of inert sera contained in such a mixture are sufficient contraindications for its use.

Specific treatment of Type I pneumonia by Type I serum is, on the other hand, distinctly indicated.

The following routine, advised by Cole, was employed at the Base Hospital, Camp Devens, Mass.: Upon submission to the laboratory of a satisfactory specimen of sputum, every case of acute lobar pneumonia received an intracutaneous injection of 0.02 Cc. of horse serum diluted to 1.10 with salt solution. A similar injection of salt solution served as a control. This test to determine sensitization is of great im-

portance. The site of each injection immediately presents a wheal, which soon disappears. Sensitization is indicated by a distinct indurated wheal, surrounded by an area of hyperemia, which appears after a few moments. The test is considered negative when no reaction is found an hour after injection. To safeguard against accident, even when the latter reaction is negative, it is wise to administer a desensitizing subcutaneous dose of 0.5 to 1 Cc. of horse serum, upon completion of the sensitization test. Following this routine procedure it is customary to start the intravenous administration of serum as soon as the diagnosis of the type has been made. Ninety to 100 Cc. of serum, diluted with equal parts of sterile salt solution prepared from freshly distilled water, is warmed to body temperature and injected into the median vein under the usual aseptic precautions for intravenous medication. The gravity method is usually employed, although the syringe and three-way stopcock has given good results at Camp Devens. In either case care should be taken to maintain the temperature of the fluid during its introduction, which should consume at least twenty to thirty minutes. Careful observation of the patient during the administration of the first 10 to 15 Cc. will often obviate serious trouble. At the appearance of cyanosis, pallor, or dyspnea, the administration should be discontinued and resumed only on the disappearance of these threatening signs. Treatment should be given at eight-hour intervals until a distinct improvement in the patient's condition is noted.

When the sensitization test is positive, or when the patient gives a history of asthma or other vasomotor difficulties, extreme care should be taken in this treatment. In such a case Cole recommends the subcutaneous injection of 0.025 Cc. of serum. The subsequent doses, given at half-hour intervals, should be double the previous dose until 1 Cc. is reached. At that point 0.1 Cc. may be given intravenously, and that dose doubled at half-hour intervals. After a total of 25 Cc. has been reached in this manner, 50 Cc. may be given after a four-hour interval and the regular dose after six to eight hours. The appearance of signs of anaphylaxis should cause the suspension of treatment for two to four hours and the resumption at a dose lower than that which produced the reaction.

There is, unfortunately, no relation between reaction and curative power of the serum. One-half to one hour following the injection the patient is likely to present the so-called thermal reaction, characterized by chill, cyanosis, and a distinct elevation of temperature. This is followed in a few hours by a fall in temperature, profuse sweating, and relaxation. This apparently precipitated crisis may often be permanent and the subsequent convalescence be uneventful. Often, however, the temperature rises again in four to eight hours and further treatment is indicated. In a certain number of cases symptoms of anaphylaxis may develop very shortly after serum administration. The symptoms are those noted previously as danger-signals during the injection. The patient generally presents cyanosis, dyspnea, and collapse. The immediate subcutaneous injection of 0.6 Cc. of 1:1000 adrenalin is generally sufficient to give relief. Although this complication is not common, it is never safe to proceed with the treatment, unless this preparation of adrenalin is at hand.

Serum sickness may and generally does follow in the course of seven to ten days. It varies in severity from occasional urticarial wheals to universal erythema. Arthralgia may be a troublesome complication. The treatment of this condition is symptomatic.

Cole states that in every 100 cases of lobar pneumonia thirty-five are due to Type I and ten die; thirty are due to Type II and ten die; ten are due to Type III and six die; and twenty-five are due to Type IV and four die. Just as the incidence by types varies according to seasonal and other influences, so apparently does the mortality of the different forms of the disease. Although Type III is admitted to be a very severe form, Cecil reports from Camp Upton a high mortality from both Types II and IV. Alexan-

der points out similar yearly variations in mortality. In the Camp Devens series high mortality existed very frequently in Types II and IV. At one time a small epidemic of Type III cases presented a relatively low mortality. The intercurrence of other disease processes certainly plays an important rôle in prognosis. During the "influenza epidemic" the mortality from pneumonia showing Types I and II was greatly increased.

Although variations in mortality of the types not treated by specific methods is of general interest, yet that of Type I alone is of importance in this discussion. It is generally admitted that untreated cases of this class present a mortality between 25 and 32 per cent. In a special series studied at Camp Devens during the influenza epidemic a mortality of 43 per cent was found among those treated with low-grade commercial serum.

The most reliable results of this treatment are furnished by Cole. In a series of 107 cases of this type, treated as outlined, the mortality was reduced to 7.5 per cent. In the series at Camp Devens during the influenza epidemic, noted in the preceding paragraph, the mortality of such cases treated with a high titre serum was reduced from 43 to 7 per cent. In addition to these striking reductions in mortality, it is certain that the administration of serum causes the sterilization of the blood and a limitation of the spread of the process. It is unfortunate that there is not a corresponding reduction in the number of complications.

The specific treatment of Type II pneumonia is still in the experimental stage. Cecil reports favorable results. In a small series at Camp Devens the results were encouraging. Personal experience and the review of literature reveals insufficient data to warrant further discussion of this method of treatment.

Spooner concludes: (1) That thirty per cent of cases of acute lobar pneumonia are due to Type I organism. (2) An immediate diagnosis of type is essential for the early administration of specific sera. (3) The use of polyvalent sera is irrational and unjustified. (4) Careful use of Type I serum in Type I pneumonia is safe. (5) It has reduced the spread of the disease process and the mortality to a sufficient extent to indicate its universal application.

PERSISTENT OCCIPITOPOSTERIOR POSITIONS.

MILLER, in the *New Orleans Medical and Surgical Journal* for February, 1920, asks the question, When and how are we to assist the normal forces in the completion of labor under these circumstances? He believes in all cases our attitude should be that of watchful waiting, until positive indications arise for interference, assuming of course that the case has been thoroughly studied, and all possibilities of contracted pelvis, or any condition which would not permit of delivery through normal passages, have been eliminated.

Should the conditions arise for interference when the head is still floating, dilatation of cervix and manual rotation to a more favorable diameter is effected. This maneuver may be further augmented by applying forceps, forcing engagement in the new diameter, and then left to nature. By no means is a version and breech extraction to be attempted, as the "waters" have long since drained away, and the cervix very likely not fully dilated.

Probable dangers for the mother when version and extraction are done under such circumstances are rupture of uterus, dangerous lacerations of cervix and vagina. Injury is almost inevitable for the fetus.

Persistent posterior positions recognized after engagement have several possible terminations: (1) Remain posterior; (2) brow presentation; (3) face presentation. In either case it is the best rule to wait for a possible natural termination of the labor if the condition of the mother and fetus is satisfactory. Should we have to resort to artificial means, however, forceps is the undisputed method of choice. For the face and brow presentations suffice it to say that with a proper application of forceps the case is delivered as nearly according to

natural mechanism in these cases as possible.

When the occiput remains posterior, we have a different proposition to deal with, and one which often taxes the skill of the obstetrician. The completion of these cases is again by means of forceps. A special forceps maneuver, the Scanzoni method, is a happy solution to the problem, if properly conducted. Indeed, it has been so satisfactory that he presents it here as the one method of caring for these cases, attempting to interpret the few mooted points which have caused it to fail in some instances.

He outlines in *a, b, c* order the steps of this forceps maneuver, as each one explains its own motive.

1. The forceps are applied to the head in O. P. position, according to certain scientific rules, and not haphazardly, with the sole idea of getting a grasp on the head. There is no excuse for getting other than a true cephalic application, except in cases in which the landmarks have been obliterated by a large caput.

2. Proper application having been attained, gentle traction in direction of the pelvic canal is made, without any attempt to manually rotate. Too much stress cannot be laid on these two points, as a failure to appreciate their significance will lead to disastrous results, or a failure in the attempt to deliver.

3. Further traction is made until head is brought down on the pelvic floor, the occiput being still posterior. Here slight upward traction is made to favor flexion. Continued traction now brings the natural rotating forces of the pelvis (levator ani, ischial spines, double inclined plane of pelvis) into action, and one is rewarded in seeing the occiput rotate anteriorly of its own accord. So serious is any attempt to rotate the head with forceps at this stage that it is best to sacrifice the perineum and deliver the head in posterior position, should the head fail to rotate as above described. The latter happily fails to do so in very rare instances.

4. The occiput having rotated anteriorly causes the forceps to be applied upside down. They are now released, removed, and reapplied acccording to technique required by anterior position.

The essential points to remember in this summary of treatment are that forceps are to be used solely as traction agents, and that the natural mechanics of the pelvis will accomplish the rotation if the head is brought far enough down. Frequently the head will bulge the perineum and look as though delivery is about to take place before this natural rotation occurs.

"THE TYRANNY OF THE WASSERMANN TEST": A BENEVOLENT DESPOTISM.

HIGHMAN, in the *Archives of Dermatology and Syphilology* for February, 1920, writes indicating what appear to him to be the liabilities and assets of the Wassermann test. The liabilities are numerous; some are avoidable, others not. The avoidable ones are due to carelessness, or improper training on the part of the serologist. If the warnings and strictures of such writers as Kolmer and Ottenberg were heeded, purely technical faults would be largely overcome.

The unavoidable sources of error are more numerous and subtle. Impurities in the glassware, time and method of incubation, nature of antigen, dilution of complement, are factors indicating elusive phases of the technique that have been pointed out in the work of the two serologists already mentioned. Nor is the test in a restricted sense specific, for it is not spirochetes that are employed as antigen. Thus, the phenomenon must be defined as a non-specific complement fixation test usually indicating active syphilis, provided certain other diseases have been ruled out. It is understood that it may normally be negative in the early initial period, and during any period of latency throughout the disease. With these exceptions a positive test indicates active syphilis, and a negative test cured or latent syphilis. It must further be reëmphasized that it may be

negative in malignant syphilis, neurosyphilis, and at times in tertiary syphilis.

In these apparent contraindications lie the limitations of the procedure. In active syphilis there may be no evidence of the disease, except the positive test. The physician is thus confronted with the task of determining the seat of the malady. If a careful physical examination reveals no changes in the heart, vessels, kidneys, liver, alimentary tract, bones, or nervous system, it is difficult to translate the evident facts of an active process into terms of diagnosis, prognosis, and treatment. Conservation requires, however, that treatment be given indefinitely to forestall future injury to the patient. The object is not the paltry endeavor to render the test negative, purely a pursuit of shadows, but to prevent greater inroads on the host by the parasite.

The negative test indicates, as repeatedly stated, cure, latency, a stage of malady too early for serologic recognition, or a total absence of the disease. Which of these obtains in a given case is again a problem involving nice discrimination. A cure may be assumed if the test is negative, and if other objective evidence of the disease is wanting after adequate treatment over a number of years, and after prolonged subsequent observation and control without treatment. Latency may be assumed if the test is negative early in the disease, and here, regardless of the negative test, treatment should be continued. There can be no confusion caused by a negative test in the primary stage, for the dark field comes to the rescue. Absence of syphilis may be assumed if the test is negative, and if there are neither history, symptoms, nor signs of the disease. Deficiency in immunization explains the negative test in malignant and tertiary syphilis.

What has so greatly obscured the issue has been a wide tendency to make synonyms of the Wassermann test and syphilis. The reaction is actually but one sign of the disease, and the numerous attributes of the Wassermann test are subject to the same influences and have the same diagnostic and therapeutic value as any other single, objective feature of the malady. If this were only understood, many of the apparent inconsistencies of the reaction would be eliminated. Finally, then, Highman may be permitted to paraphrase Lisser's conclusions as follows:

1. A positive Wassermann test is undoubted evidence of active syphilis, yaws and nodular lepra having been excluded.

2. Since it constitutes such evidence, it is a subtler sign of the disease than the ordinary objective phenomena. Not all lesions, however, associated with the positive test are syphilitic. Thus a syphilitic with gastric carcinoma, corns, acute lobar pneumonia, beriberi, cerebrospinal meningitis, scabies, lupus vulgaris or any of the acute exanthemata, etc., would give a positive reaction, but these conditions would not be syphilitic. Mastering such facts, and not railing at them, is the test of a true syphilographer.

3. The negative test means: (*a*) absence of the disease, (*b*) latency, (*c*) recovery, (*d*) a period too early in the initial stage for the formation of antibodies, (*e*) deficiency in immunization. It is for the syphilographer to make a proper interpretation.

4. It is a resistance reaction; hence it indicates active syphilis.

5. Regardless of a negative or positive reaction, a patient should be treated adequately for syphilis, according to the stage of the disease and the age of the patient. The younger the patient, the longer the treatment should be continued, because of the greater number of years ahead of him in which the sequelæ of the disease may develop. This is a fine phase of syphilography too little understood.

6. Treatment should be guided by the Wassermann reaction, but should not be prejudicially influenced by optimism at its too early conversion to a negative reaction. There is no clinical cure without a serologic cure, for the test is one of the important signs of the disease.

7. When the diagnosis of syphilis has been established, enough Wassermann tests should be performed to serve as an aid to the physician in his management and views

of the case. This will subserve his conscientious efforts, and he will not be misled into a sense of false security by evading an unpleasant subtle reminder of his therapeutic limitations.

8. The Wassermann test should be employed as an adjuvant to clinical judgment, which is synonymous with common sense.

9. Thus viewed, the Wassermann test will be divested of its fancied tyranny and become a docile servitor of the syphilologist.

ARTIFICIAL ROTATION OF THE HEAD IN PERSISTENT OCCIPITOPOSTERIOR POSITIONS.

In the *Edinburgh Medical Journal* for March, 1920, LACKIE states that a diagnosis of an occipitoposterior position having been made, it is not recommended that interference take place at once. So long as progress is made in any way, and that not too slowly, the case should be left to nature, and in a large proportion of cases the result will be satisfactory, especially under the influence of "twilight sleep." If, however, hour after hour passes and the head remains high up, with the os not fully dilated, and the pains become weak, the patient should be anesthetized and the whole hand introduced into the vagina. The dilatation of the os is completed artificially and the hand is passed beyond the head; the membranes are then ruptured, and the fingers reaching a shoulder, the whole child is rotated on its longitudinal axis, with the help, if necessary, of the left hand acting through the abdominal wall. The vertex is thus placed in the R. O. A. position, or even in the L. O. A., and the hand is then withdrawn, preferably during a contraction, if such exists. After allowing a short time for molding of the head, forceps are applied and easy delivery effected. Forceps are required in most cases, since, by this stage of the labor, the mother is exhausted and the contractions of the uterus are feeble, but spontaneous delivery is possible, although it has no advantage. Nothing is easier and simpler than the manipulation just described, and what at first seems likely to be a most difficult labor becomes in the later stages an almost normal and natural one.

Such is the ideal management of a persistent occipitoposterior position, recognized and rectified at the ideal time—viz., at the end of the first stage of labor, before the liquor amnii has escaped, but only, of course, when it becomes clear that interference is necessary. But what of the more frequent condition in which the position is not diagnosed till the second stage of labor is entered upon, the liquor amnii has escaped to a large extent, and the head is more or less fixed at the brim or in the cavity of the pelvis? The treatment so commonly recommended of promoting flexion by pressing up the sinciput during a contraction is useless. If the case has reached the stage when artificial aid is required, the pains are unsatisfactory, and promoting flexion, and at the same time attempting to press the sinciput round the pelvis, does absolutely no good at all. In these cases the hand must be introduced into the vagina and an attempt made to push back the head and to rotate the whole child just as was recommended in cases treated during the first stage. If this is impossible, as it often is, the head must be grasped with the hand and rotated into an anterior position, while at the same time the left hand, acting through the abdominal wall, attempts to rotate the shoulders. If the shoulders cannot be rotated, the difficulty is to get the head to remain in the anterior position, and one must fix the head as much as possible with the right hand and apply the forceps with the left. It has been urged that this maneuver is attended with danger to the child since the neck must be twisted, but this danger is exaggerated, and no harm really results.

Supposing that this manipulation fails and the head cannot be rotated by the hand, there is still a maneuver which should be resorted to before relying on traction only. This consists in applying forceps in the usual way and rotating the head by means of the instrument. This method has recently been strongly advocated by Bill of

Cleveland, Ohio, in a paper read at a meeting of the American Association of Obstetricians and Gynecologists. It can be used equally well in multiparæ and in primiparæ, and it can be used when the head is at the brim, in the cavity, or at the outlet. The cases most suitable for this forceps-manipulation are those in which the head is through the brim and is lying in the cavity of the pelvis or on the pelvic floor, for then only can the essential sweeping movement of the handles be carried out. When the head is high up at the brim, rotation by the hand is safer and easier. Having applied the forceps it is well to push the head gently and slightly back, and then rotation is easier. Some American obstetricians carry a straight pair of forceps for the purpose, but the ordinary forceps with a pelvic curve do perfectly well, provided the rotation is properly done. The handles are carried round in a large circle, just as a sound is used in replacing a retroverted uterus. This sweeping movement of the handles keeps the blades in the same axis during the rotation, which is accomplished quite easily, and once the occiput occupies an anterior position it is well to exert a little traction so as to fix the head and prevent it turning back to the original position. The forceps are then removed and reapplied, and the delivery slowly effected. Then, and then only, is traction used at all. If the head does rotate back the manipulation must be repeated. The important point in this maneuver is that during rotation there should be no traction. It must not be an attempt to produce a spiral movement on the part of the head by a combination of rotation and traction. Only after rotation is accomplished should traction be adopted.

In these cases of persistent occipitoposterior position every possible maneuver should be adopted to rectify the malposition before resorting to brute force in delivering the head either without rotation occurring at all, or only after much severe pulling, when it may rotate at the outlet. Such treatment tends to cause severe damage to the mother and the child at the time, and is the most frequent cause of prolapsus uteri later, since the dragging on the anterior segment of the pelvic floor while the occiput is behind so loosens the anterior vaginal wall from its underlying tissues that later the various stages of descent of the uterus readily occur.

THE GASTRIC RESPONSE TO FOODS.

MILLER, FOWLER, BERGEIM, REHFUSS, and HAWK, in the *American Journal of Physiology* for March, 1920, report a study of the response of the normal human stomach to thirty different kinds of vegetables prepared in different ways. One hundred and twenty-four experiments were made on twenty-five normal men. The evacuation times and acid responses of the stomach were determined and physical and chemical changes in the ingested food noted. Subjects were classified as belonging to the slow- and rapid-emptying types.

The average evacuation time for all subjects of the rapid-emptying type was two hours and for the slow-emptying type two and a half hours. The averages of the high points of the total acid curves were 70 and 77 respectively.

The response of the stomach to potatoes prepared in the following different ways was determined: whole boiled, creamed, mashed (with and without milk and butter), baked (with and without butter), potato salad, French, German and plain fried potatoes, and potato chips. All of these left the stomach in moderate time, or one and a half to two and a half hours for rapid-type individuals and two to three and a half hours for the slow type. Baked potatoes with butter required more than the average time, but plain baked potatoes about the same time as boiled potatoes. The addition of milk and butter to mashed potatoes had little effect, nor did creamed potatoes or potato salad differ much from plain boiled potatoes as regards gastric response. Fried potatoes left the stomach as rapidly as potatoes prepared in other ways; French fried potatoes a few minutes longer than German or plain fried potatoes. Potato

chips were handled very rapidly by the stomach considering their high solid and fat content.

Sweet potatoes, whether boiled, baked, or fried, remained longer in the stomach than white potatoes cooked in the same ways. Dasheens, whether boiled, baked, or fried, required a longer period of gastric digestion than white potatoes, but no longer than sweet potatoes. Cassava roots were fed boiled and baked and found to require a little longer than white potatoes similarly prepared. Boiled oyster plant required about the same period of gastric digestion as white potatoes.

Boiled red beets left the stomach rapidly —*i.e.*, in from one to two hours. After being pickled in vinegar they left still more rapidly, the vinegar evidently hastening the evacuation. Raw carrots also left the stomach rapidly (in from one and a half to two hours). Boiled carrots took distinctly longer (two and a half hours). Boiled parsnips required distinctly longer than beets or carrots. Boiled turnips left the stomach in one and a half hours. Radishes in amounts of 50 grammes left the stomach very rapidly (in from one and a quarter to one and a half hours).

Baked beans, as might be expected from their high protein content, remained somewhat longer in the stomach than most other kinds of vegetables and developed higher combined acidities. String-beans, on the other hand, left the stomach rapidly, resembling more closely the green vegetables in stimulatory power upon the stomach. Boiled peas required 105 minutes in each of two cases, or less time than baked beans. Boiled lentils appeared to require a little longer than peas, while raw endives resembled peas as far as evacuation times were concerned.

Asparagus left the stomach rapidly. Boiled cauliflower required only a few minutes longer in one case, but in a subject of the slow type showed delayed evacuation.

Cabbage whether raw or cooked left the stomach rapidly even in subjects of the slow-emptying type. Boiled cabbage was not handled more readily than the raw. Cole-slaw and sauerkraut required distinctly longer to leave the stomach than plain cabbage.

Lettuce in spite of its bulky character was found to be one of the most easily evacuated foods, the response to this food resembling that of cabbage. The addition of sugar and vinegar or oil and vinegar delayed evacuation.

Celery in the raw state is evacuated more slowly than cabbage or lettuce, but creamed celery caused less difficulty. Spinach remained in the stomach distinctly longer than most vegetables.

Onions stewed and fried showed slower evacuation than other vegetables low in protein, but no longer than high protein vegetables, when fed in moderate amounts.

Creamed chayotes left the stomach rapidly; cucumbers did not impose any special burden on the stomach, whether salted or unsalted. The unsalted required but a few minutes longer than the salted cucumbers.

Boiled squash required two and a quarter hours, or about the same time as boiled carrots or sugar corn.

Raw tomatoes left the stomach very rapidly in all cases. Boiled tomatoes required a longer time.

Mushrooms require only a moderate period of gastric digestion—two and a quarter hours with a subject of the rapid type.

Stewed corn left the stomach almost as rapidly as raw carrots or tomatoes, and boiled hominy required but little longer.

Boiled unpolished rice and boiled barley were readily handled by the stomach, and usually passed into the intestine sooner than boiled polished rice.

Raw agar-agar left the stomach in one and a half hours as compared with two and a half hours for boiled unpolished rice. Hemicelluloses appear therefore to leave the stomach very rapidly, and show a certain analogy with vegetables such as cabbage and lettuce.

In general raw vegetables low in protein, as carrots, celery, tomatoes, cabbage, lettuce, and cucumbers, leave the stomach rapidly,

develop moderately high free acidities, but little combined acidity, and leave more rapid and complete disintegration. Vegetables high in starch such as potatoes show very considerable starch digestion before leaving the stomach. In certain cases hardly any starch reaction could be obtained toward the end of digestion.

SINUS ARRHYTHMIA IN CHILDREN.

BASS, in the *Archives of Pediatrics* for February, 1920, briefly reviews the various types of arrhythmia which are met with in childhood, laying special stress on the prognosis connected with each variety. These types are: (1) Sinus arrhythmia; (2) simple tachycardia; (3) paroxysmal tachycardia; (4) auricular fibrillation; (5) heart block; (6) premature beats.

Sinus arrhythmia is by far the commonest form of juvenile irregularity. This condition arises from changes in the vagus impulse, which results in the heart, as a whole, beating at different rates at different times. Very marked varieties of sinus arrhythmia might perhaps be considered as bordering on the pathological, but this type of irregularity is found in practically all children, so that it is spoken of as physiological irregularity. It is very important to bear this fact in mind since many parents have been unduly alarmed by being told that their children were suffering from heart disease when in reality the condition present was only sinus arrhythmia. In diagnosing this condition the child should be asked to take deep breaths, when the irregularity of the pulse would be brought out more clearly. Following this, the child should be asked to take some rapid exercise, when the irregularity, if due to sinus arrhythmia, would diminish or entirely disappear. As a final test, though this is rarely necessary, atropine may be administered, following which the irregularity disappears owing to the blocking of the vagus impulses. This condition needs no treatment *per se*, though when present in high-strung neurotic children it should be regarded as one of the evidences of nervousness, and the appropriate treatment of the condition instituted. Under no circumstances should exercise be forbidden on account of the heart irregularity alone.

Under the head of simple tachycardia are included all those cases of rapid heart in which the pulse tracings or electrocardiograms reveal no abnormality of the heart mechanism except increased frequency of the beat. These cases differ from paroxysmal tachycardia in that the electrocardiogram shows the impulse in the heart to rise at its normal site of origin, whereas in paroxysmal tachycardia the impulse arises elsewhere. Simple tachycardia may result from nervousness, hyperthyroidism, or from conditions in the heart muscle itself making increased demands on the circulation. It was associated with fever and certain disturbances of nutrition, such as scurvy. In rare instances tetany may be the cause of tachycardia.

Paroxysmal tachycardia is a condition characterized by sudden attacks of very rapid heart action in which the electrocardiogram shows that the impulse during the attack fails to arise in the sinus node, but originates in some other portion of the heart tissue. The cause of these attacks is not at all clear. Some of the cases occurred in previously healthy children: others were found in children suffering from rheumatic carditis or diphtheritic myocarditis. Contrary to the condition in adults, the great majority of cases in children occur in individuals free from valvular disease. It may occur at any age, the youngest reported case being 28 months old. The attack starts very suddenly, accompanied by an abnormal sensation in the heart region, occasionally by vomiting and depression. It was quite remarkable to see how comparatively comfortable these children are even when the pulse-rate lies between 200 and 300. In addition to the rapid pulse there is excessively rapid pulsation at the wrist. The duration of an attack varies from a few hours to several weeks. Not enough cases of tachysystole had been carefully observed to permit one to speak

with any degree of positiveness as to the prognosis. If the attacks do not occur with great frequency and if the heart muscle does not seem much affected, the outlook as to life is apparently good, since many of the cases are reported in adults who have survived, though their attacks began in childhood.

Auricular fibrillation is infrequent in childhood and its characteristics when present in early life do not differ in any way from those found in adults. The reason it is rare in childhood is because it almost never occurs in a heart previously healthy.

Heart-block in children, contrary to the condition in adults, is due to the acute, rather than to the chronic, cardiac diseases. Whereas the common causes in adults are syphilis and arteriosclerosis, in children acute rheumatism, diphtheria, and less often pneumonia are the chief etiological factors, though it may less commonly be due to congenital malformation. Too few examples of heart-block have been examined and followed up for one to be able to say much in regard to their prognosis. They undoubtedly must be looked upon as very serious cases, and, especially when accompanied by defective cardiac development, should call for a very guarded prognosis.

Premature beats are not a very frequent finding in childhood. While in adults they are of no very harmful portent, in childhood they are often an indication of severe damage to the heart muscle. There is considerable difference of opinion as to the prognostic significance of extrasystoles. Personally Bass could truthfully say that he has never observed extrasystoles in children except in cases in which he could put his finger on a real cause for serious heart damage. Thus he has seen them in the course of diphtheria, and has seen them persist for several years after an acute illness.

In summing up, Bass says the fact should be emphasized that, contrary to the views entertained five or ten years ago, the cardiac arrhythmias are not confined to adult life. Moreover, practically all the various forms of irregularity are represented in early life. It is also of considerable interest to note that the same clinical conditions may have an entirely different etiology in childhood and in adult life. On the other hand, he does not wish to convey the idea that arrhythmias are commonly encountered during childhood; he believes, however, that they are of frequent enough occurrence to be of considerable clinical importance. Now that most of the larger hospitals are equipped with electrocardiographs, he thinks that pediatricians should make an effort to examine all cases of cardiac arrhythmia cardiographically in order that their knowledge of this relatively new and unexplored field may be rapidly increased.

THE TREATMENT OF MALARIA.

Cowan and Strong, in the *Quarterly Journal of Medicine*, state that the ideal conditions of treatment of cases of primary malaria are (1) the institution of treatment as soon as the symptoms ensue; (2) the continued administration of quinine in large doses for three or four weeks, during which the patient must remain in the hospital; and (3) convalescence in a mosquito-free area, preferably at the seaside, or among the hills.

Blood-films must invariably be taken, for future examination, before any quinine is administered, as it is difficult to find the parasites after quinine has been given. The mass of the infection should be gauged, as well as its nature. The absence of parasites does not disprove the existence of malarial infection, but they are rarely absent in cases in which fever is present, unless quinine has been administered.

The patient must be kept in bed and at rest during the continuance of the fever, and for some days subsequently. An early resumption of activity is a common cause of failure to overcome the infection.

The diet at first should be fluid and easily digestible. The bowels must be kept

open. A mercurial is useful at the outset, and should be repeated twice or thrice weekly.

Quinine should be administered as soon as the diagnosis is made, irrespective of the presence or absence of fever. It is best given in solution, but may be given in powder, in cachets, or capsules. Pills and tablets should not be used, as they are often hard and relatively insoluble. The bihydrochloride, the hydrochloride, and the hydrobromide are the best preparations. The sulphate requires the addition of acid to insure solution. An aromatic, such as cardamoms or chloroform, should be added to the mixture.

The initial dose lies between 30 and 60 grains daily. The larger dose is rarely required. The dosage should be gauged by the degree of severity of the symptoms and the mass of the infection as shown on the blood-film. Grains 45 is a common dose. It should be continued while the fever lasts, and for three to seven days subsequently. The dose may then be reduced to 30 grains, and this should be continued until the patient has been afebrile for at least twenty-one days. The drug may be given thrice daily after food. Brem recommends that the three doses should be given in quick succession in the morning, but Cowan and Strong have found that it is generally better tolerated after food. It is sometimes helpful, during the fever, to give it in four-hourly doses. Intolerance of the drug is rare, save in the presence of gastrointestinal symptoms. Tinnitus and deafness can generally be ignored. They are less troublesome if the hydrobromide is used, or if bromide of sodium be added to the mixture.

It is essential to make sure that the drug is absorbed. Oral administration is contraindicated in cases in which gastric or intestinal symptoms (vomiting, diarrhea, dysentery) are present, and in cases in which the tongue is thickly furred. Rectal injections are sometimes possible in these cases and the quinine is said to be absorbed rapidly. But intramuscular injections are generally necessary. These are preferable in cases of massive infection, as shown on the blood-film, in patients with cerebral symptoms, however slight, or pulmonary or abdominal symptoms, and in cases in which the fever is not influenced by oral administration.

There is a general feeling that intramuscular injections are desirable in the early stages of subtertian infections. This is recommended by 9 of 26 officers as a routine, the initial dose varying from 12 to 45 grains. With the smaller doses 20 to 30 grains are given in addition by the mouth. One officer recommends intramuscular injections at the outset in benign tertian infections. They believe that there is little difference in the reaction of benign and subtertain infections to quinine, and they are inclined to give some intramuscular doses to all cases at the outset, as they think with MacKenzie that the duration of the fever is shortened.

One officer recommends intravenous injections (10 to 15 grains) for the first two days in subtertian infections. This Cowan and Strong consider unnecessary. The indications for intravenous injections are those that indicate the necessity for rapid destruction of parasites—*i.e.*, cases with cerebral symptoms of any kind, whether of the comatose or delirious type, and cases with collapse, marked cyanosis, acute abdominal symptoms, or hyperpyrexia.

The bihydrochloride is the most suitable drug for intramuscular injections, dissolved in normal saline solution (10 grains in 10 Cc.). It should be injected deeply in the gluteal muscles, well away from the sciatic nerve. The needle should be thoroughly emptied before withdrawal. The most scrupulous asepsis must be maintained.

For intravenous injections the hydrochloride is most suitable, as the solution is neutral. The usual dose is 10 grains dissolved in 10 ounces of warm normal saline solution. The injection must be made slowly, fifteen to twenty minutes being occupied in the operation. The maximum daily dose is about 30 grains.

In toxemic cases the amount of saline

solution may be increased to one or two pints. The presence of edema of the lungs is of course a contraindication.

The treatment of relapsing malaria differs in some respects from that of primary attacks.

Cowan and Strong have classified the patients into three main groups. In one the men are ill, and evidently require hospital treatment. In the second the men are not ill, but are liable to recurring attacks of ague. In the third the men are unfit, but not seriously ill, and are also liable to ague fits.

During attacks of fever all these patients must, of course, be treated in the same way as during primary attacks. One must remember, however, that men who are quinine-sodden require much larger doses of quinine than those which would be efficacious in men who are not quinine-sodden. Not infrequently the fever persists so long as the drug is given by the mouth, though it passes off at once when it is given intramuscularly. In some cases it persists in spite of quinine.

The reason is not always manifest. In some the alimentary tract is out of order, and success ensues as soon as this is remedied. In some the cause of the fever is not malaria, but some coincident infection, such as enteric fever, dysentery, or phthisis. A complete examination should always be made in every case, for they have often seen two or three different infections in the same patient—malaria, bacillary dysentery, and ankylostomiasis, for example, or malaria, bronchopneumonia, and amebic dysentery. The cause may be an abscess in the buttock, an acute osteomyelitis, a tonsillitis, or a urinary infection. In many cases the real cause is the continuance of the infection, the patient being too debilitated to overcome the disease, however much quinine may be given. It is in this group of cases that arsenic is so useful. A. Balfour recommends the addition of a few minims of the liquid to each dose of quinine, a method which is often successful. But they prefer to give it separately. Cowan and Strong have tried several methods, all of which are at times useful. A full crescendo course, by the mouth, the dose being rapidly run up to 30 to 45 minims per diem, the whole course lasting for three to four weeks, is useful. Liquor arsenicalis given hypodermically in doses of 3 minims, which Silvester recommends, or sodium cacodylate, given intramuscularly in doses of ¾ grain for seven days, as suggested by Willmore, is advisable.

METHOD OF TREATMENT FOR NEUROSYPHILIS.

KOLMER, in the *Journal of the American Medical Association* of March 20, 1920, states:

1. A "course" of treatment covers four weeks; during this period, twenty-four inunctions of mercury, 360 grains of potassium iodide, and four combined intravenous and subdural injections of arsphenamine are given, followed by an intermission.

Treatment begins with daily inunctions of mercury for one week and the oral administration of 5 grains of potassium iodide three times a day. At the end of this week the first intravenous and subdural injections of arsphenamine are given, and they are repeated at intervals of a week until four have been administered. Mercurial inunctions and potassium iodide are given throughout, excepting on the days when arsphenamine is administered. The urine is examined at least once a week for evidences of renal irritation. If intolerance to mercury or iodide or both develops, the doses are reduced or the administrations are given every other day.

2. On the day when the intravenous and subdural injections of arsphenamine are given, the patient is put to bed at noon and lunch is omitted; light supper is generally permitted, and additional refreshment is given at 9 P.M. if food is desired. If the patient is constipated, a mild cathartic is given the day before to insure an evacuation of the bowels during the morning hours.

3. Six-tenths gramme of arsphenamine

is dissolved in 150 Cc. of sterile physiological sodium chloride solution prepared of freshly distilled water, and a 15-per-cent solution of sodium hydroxide is added until the solution is just completely cleared, the amount of alkali being measured as drops or one-tenth cubic centimeter; after complete neutralization (clearing), three or four drops more of the alkali are added to the solution. *Sterile* saline solution is now added to bring the total volume to exactly 200 Cc.; each cubic centimeter of the solution contains, therefore, 0.003 gm. of arsphenamine, and 1 Cc. is removed to a sterile test tube to be used about one hour later in dose of 0.1 Cc. (0.0003 gm.) for arsphenamizing the serum *in vitro* and subsequent intraspinal injection.

4. The solution of arsphenamine is now administered by intravenous injection, the dose being approximately 0.6 gm., well diluted.

5. Immediately after the intravenous injection, 25 Cc. of blood are removed from a vein of the opposite arm with a sterile Record or Luer syringe and expelled into a sterile 50-Cc. centrifuge tube fitting the International centrifuge. The tube has a narrow neck facilitating the use of a sterile rubber stopper, and carries 4 Cc. of a sterile 10-per-cent solution of sodium citrate in physiologic sodium chloride solution to prevent coagulation of the blood.

6. The blood is at once gently mixed with the citrate to prevent coagulation and immediately centrifuged at high speed for at least twenty minutes, 10 or 12 Cc. of the clear plasma being pipetted aseptically to a sterile test-tube. Sodium citrate may be omitted and the coagulum of blood gently broken up with a sterile glass rod before centrifuging, but from ten to fifteen minutes are required for coagulation before breaking up the clot, and the resulting serum is usually tinged with hemoglobin; the latter, however, is not harmful.

7. One-tenth Cc. of the solution of arsphenamine held in readiness is now added to the plasma or serum and thoroughly mixed; the dose is 0.0003 gm. (⅓ mg.), which is safe for the first injection. Subsequently the dose may be increased to 0.2 Cc. (0.0006 gm.) and occasionally to 0.3 Cc. (0.0009 gm.); he has never given a larger amount.

8. The arsphenamized serum is placed in a water-bath at 56° C. (132.8° F.) for thirty minutes.

9. Spinal puncture is now performed in an aseptic manner in the lateral posture with a gauge No. 19 Babcock needle; the diameter of this needle is about 1 mm., which insures a slow rather than rapid flow of spinal fluid and consequently a gradual drop in cerebrospinal fluid pressure, and the needle fits the Record syringe. Preliminary to puncture in the third or fourth lumbar interspace, the skin and subcutaneous tissues are infiltrated with about 1 Cc. of sterile 1-per-cent procaine by means of a No. 26 needle, which renders spinal puncture almost painless. Spinal fluid is allowed to flow until about 30 Cc. are secured; at this time the flow is quite slow, many seconds being required for the formation of a single drop. The warm arsphenamized serum (usually from 10 to 12 Cc.) is now slowly injected by gravity or with a Record syringe. As a general rule the slow injection of 12 Cc. of serum under these conditions is almost painless. Each specimen of spinal fluid is submitted for total cell count (fresh fluid being used), protein determinations, and Wassermann and colloidal gold tests.

10. The foot of the bed is elevated and the patient requested to lie on his back for several hours, and to stay in bed until the following day. In every instance but one the patient has been able to leave the hospital the following morning, feeling no ill effects, except the soreness resulting from the needle punctures.

The time required for the operative procedures is about two hours, thus distributed:

(*a*) About thirty minutes for the intravenous injection of arsphenamine and the withdrawal of blood.

(*b*) About one hour to secure and arsphenamize the serum.

(*c*) About one-half hour to conduct spinal puncture, drain the canal, and inject the arsphenamized serum.

The 1 Cc. of solution of arsphenamine carried over in a sterile test-tube for arsphenamizing the serum may be used for this purpose with safety any time within three hours of its preparation.

The advantages of this method may be thus summarized:

1. The patient receives arsphenamine both intravenously and intraspinally.

2. Blood is removed at once, insuring in the serum a larger amount of arsphenamine than is secured after an interval of an hour, as in the Swift-Ellis method.

3. Plasma of serum is secured at once, rendering the complete treatment possible within two or three hours instead of an interval of over night between the intravenous and intraspinal treatments.

4. The removal of from 20 to 30 Cc. of cerebrospinal fluid, followed by the injection of but 10 to 12 Cc. of arsphenamized serum, very probably leaves cerebrospinal fluid pressure reduced for some time, producing increased vascularity of the cord and probably also of the brain, with the beneficial effects ascribed alone to spinal drainage. Indeed, injection of arsphenamized serum within an hour of the intravenous injection may increase extravasation from the meningeal vessels by reason of irritation produced by the serum and arsphenamine in the subarachnoid space in addition to the increased vascularity and transudation ascribed to reduction alone of cerebrospinal fluid pressure.

5. The patient receives the benefit of treatment with mercury and iodides and of spinal drainage conducted while under the influence of these antisyphilitic medicinals.

The disadvantage of the method (encountered once in his experience) is the inadvisability of giving the intraspinal treatment in the presence of a reaction following the intravenous injection of arsphenamine. The administration of arsphenamine as described has been only exceptionally followed by a reaction of flushing and chills, and with one exception the patients have expressed a desire for the intraspinal treatment and have enjoyed a good sleep and rest, toward which a psychic element due to the realization that the ordeals were over has contributed in no slight degree.

In the one case in which a reaction following the intravenous injection of arsphenamine prevented the intraspinal treatment, a second specimen of blood was drawn later in the afternoon after the subsidence of the reaction and placed in a refrigerator over night, followed by separation of the serum next day and arsphenamizing by the addition of 0.01 Cc. of a solution of arsphenamine prepared by dissolving 0.1 gm. in 30 Cc. of 0.8-per-cent salt solution, neutralizing with a normal solution of sodium hydroxide (about 4 per cent), adding two or three drops more of alkali, and then salt solution to bring the total volume to exactly 33 Cc.; 0.1 Cc. of this solution added to the serum represents 0.0003 gm. of arsphenamine (⅓ mg.). After heating the arsphenamized serum at 56° C. for thirty minutes, spinal puncture, drainage and intraspinal injection were conducted as described above, and the patient was kept in bed for another twenty-four hours, which he regarded as a wise precaution after intraspinal treatment or even simple spinal puncture and the removal alone of 5 Cc. or more of spinal fluid for laboratory examinations.

THE INSTINCTS, THE EMOTIONS, AND THE ENDOCRINES IN STERILITY.

In the *Medical Record* of March 6, 1920, BANDLER states it is most important to judge the endocrine processes of an individual at any age from childhood up, and to determine their influence on, and association with, instincts, emotions, mental and psychic reactions. All deviations from the standard in body characteristics are due to over- or under-activity of the various endocrines, or to the numerous and innumerable possible variations in their interrelation. Normality and abnormality of any of the factors concerned with a child or

adult are due to heredity and to inherited instincts and emotions plus the play of the endocrines.

While this point will be discussed more extensively in a subsequent article, sufficient of an outline will be given here to indicate the meaning of the above statement. Normally a definite balance should exist between the interstitial and glandular structures of the ovary, between the anterior and posterior pituitary, between the adrenal cortex and the medulla. The balance as well as the activities of the respective structures represented in this balance differs in the two sexes, with the testis as the male gonad.

The anterior pituitary is vitally concerned with body growth and mental development. It is associated with strength, large or broad hands, the development of the jaws (we speak of a firm lower jaw), with maturity of mind, etc., and its function is more in evidence in men than in women.

Speaking in relative terms and in view of its relation to the posterior pituitary, it is a male gland just as relatively speaking the thyroid is a female sex gland.

The posterior pituitary related to the uterus and genitalia (pituitrin, for instance) plays relatively a greater rôle, in its balance with the anterior lobe, in women than in men. Its action is associated with the tender emotions and with the sex instinct in women; and so far as the tender emotions are concerned plays, of course, a much more important normal rôle in women than in men. Relatively speaking, it may be called a female gland.

The adrenal structures are related to the instincts of flight and pugnacity and to the corresponding emotions of fear and anger. The adrenal cortex is concerned with the production of hair and exerts normally a greater influence in many phases in the male than in the female. Good adrenalin action (cortex and medulla) is essential to courage. Poor adrenal action, especially a lack of balance between the cortex and medulla wherein the cortex plays the minor rôle, is responsible for the emotion of fear, for cowardice, for anxiety. The adrenal cortex is more of a male than a female portion of the gland. The medulla, since it is more predominant in women, is therefore partly responsible for their being more "emotional," as we call it.

The ovary is closely related to the posterior pituitary and to the adrenal medulla. This combination is responsible for the characteristics of coyness and self-display. She is not the aggressor in the sense of the hunter and fighter, she is the one who is sought. Since the anterior pituitary is less active, that maturity of mind and what we call wisdom, greatly dependent on anterior pituitary action, are less marked, and men have produced the greatest philosophers.

The male gonads are responsible for the sex urge; they stimulate the adrenal cortex and the anterior pituitary more than do the ovaries in women. There are, therefore, numerous indications for the administration of the corresponding extracts in those states due to lack of sufficient adrenal cortex or anterior pituitary activity. Hence man is the fighter and the hunter, his sex instinct is much stronger, he is the aggressor and seeks the woman.

There is in woman no such mechanism producing the consciousness of sex urge as man has in the testis, vas deferens, and seminal vesicles. The combination of testis and adrenal cortex makes man more brutal, more criminal, and more coarse. It is the normal action of the anterior pituitary which is concerned with that cerebral trophic stimulation, with that maturity of mind and with that judgment which in most men act as restraining factors to the coarser instincts. A normal associated action of the posterior pituitary has a like moderating action, and if it be excessive in men, even though it does not overbalance the action of the anterior pituitary, such men are more or less emotional, have tender feelings, are fond of children, etc.

The thyroid is the great activator. According to its action it stimulates, understimulates, or overstimulates any of the functions, instincts, or emotions of the

human being. It is much less stable and much more frequently overactive in women than in men. It is the great fixer of impressions for all things in the sphere of memory, especially for all things not associated with those instincts and emotions which are specifically associated with the activity of other endocrines.

When events, occurrences, etc., which act on the instincts and arouse emotions prompt a response, there is an endocrine activity which varies in degree and in the gland involved according to the instinct and emotion affected, and the particular endocrine, or endocrines, act as fixers in association with the thyroid.

A distinct neuroendocrine path is created by every stimulus through any of the senses. Any event, process, or stimulus which has brought into activity any endocrine secretion specifically associated with the emotion aroused may be recalled, or the recall is made more easy by a subsequent activity of that endocrine. This constitutes what might be called reverse peristalsis, and plays the all-important part in dreams, and in determining the character of the dreams.

If a little child three years old before retiring is roused into a tempest of anger by any one, and a few hours later that little child in its dream shows the emotion of anger and cries out the name of the person responsible for the emotion, how are we to explain this phenomenon? What more logical and correct explanation can we give than that the adrenal outpouring associated with the emotion of anger has continued its activity during sleep and has reawakened the subconscious sphere, and in part the upper sphere, to a reproduction of the original picture? Considerations like these should make us regard the bedtime hour of children as the hour of their greatest happiness. If certain fairy tales and stories that unwittingly rouse fear were banished entirely from the lives of children the adult would have fewer phobias, fears, and anxieties.

The correction of sterility does not, as is the province of medicine, simply benefit a mental state, correct an ill, or save life; it helps to create life.

Bandler has never told a patient that the fault is her husband's, however often this may be the case. Sterility is frequently productive of depression and psychic disturbances; the causes of domestic infelicity are numerous enough, so why add this new brand to a smoldering or even brighter flame? He tells the patient to take the medication for several weeks only; that it may produce a favorable effect only after months or years; or that causes which we cannot discern and correct may right themselves even after a long interval of time. The disadvantage of this advice is that it makes the patient think the method is useless (which is a burden physicians have to bear continually in their practice). Another disadvantage is that it often throws the patient into hands favorable to dilatation, to curettage, discission, or cervical plastic, regardless of or in ignorance of the absence of spermatozoa. Perhaps this is not always so unfortunate a result, for the patient then feels that she has exhausted every known means for the treatment of her sterility. Time, plus resignation and philosophy, may then remove the too-absorbing mental concentration.

In a subsequent paper will be published a report of cases in which endocrine therapy was the only treatment given, a second series of fifty cases dealing only with the type which evidences no tangible pathology; the paper will likewise record not only the successes but the failures, with the suggestive reasons for the latter.

In conclusion, he warns against the tendency to prescribe definitely combined formulæ in tablet or other form, when such combinations are recommended as the correct therapy for certain and many of the conditions now known to be due to endocrine abnormality. The physician then loses touch with the theory and explanation of the innumerable pluriglandular states, and the study and analysis of all the factors entering into diagnosis are neglected. In the past this has been a serious hindrance to accurate diagnosis and to the proper

interpretation of the therapeutic value of the drugs entering into many of the combinations. The physician ought not to further the habit among the laity of taking drugs of any sort except on medical advice, for if he does anything to foster this habit he will be more and more looked upon as a man needed only for advice and help in those states and conditions which the public feel they cannot correctly diagnose and treat alone.

THE VALUE OF RADIUM THERAPY IN MENORRHAGIA AND METRORRHAGIA.

DEGRAIS, in the *Canadian Practitioner and Review* for March, 1920, asks and answers the question, What are the uterine conditions which cause menorrhagia and metrorrhagia, and are amenable to radium treatment? For the purpose of simplification he divides them into two classes:

1. Hemorrhagic metritis.
2. Fibromata.

1. *Hemorrhagic Metritis.*—Metritis, under which term he groups parenchymatous hemorrhagic metritis and uterine sclerosis, described by Hepp, occurring at any age; however, it is rare in young women, and is most common after forty, especially at the time of the menopause, although it often appears in women who are not menstruating.

2. *Fibromata.* — First, the fibromatous uterus, then the submucous fibroma, and finally, the interstitial form. *All of these conditions, whose principal symptom is uterine hemorrhage, are curable by radium.* He feels just as confident now that we can guarantee a cure in these cases as we used to be reserved about promising one.

Naturally his description of the technique can only be an outline; various interpretations of the method should be made, according to the extent of the hemorrhage produced by the metritis or the fibromata. But it is none the less true that here, as in the treatment of cancer of the cervix, early radium therapeutists have passed the stage of experiment, notwithstanding opposition.

The radium dosage, the thickness of the filters, and the time of application, are the three factors which vary according to the case.

Let us take, as an example, the case of a fibromatous uterus with a cavity of nine centimeters, with free metrorrhagia. In this case he uses three tubes of radium, a little more than two centimeters long, representing forty millicuries. He introduces them, one after the other, into the hollow cylindrical urethral bougie No. 20. He uses short tubes, so that there will be an articulation between each one, which will allow the sound to take a curved shape, and thus adapt itself easily to the curves of a uterine cavity, whether it be anteflexed or anteverted, retroflexed or retroverted, or perhaps indented with small submucous fibromata. A very long tube containing the same dose of radium would be much more awkward, and its introduction would cause much discomfort and pain. These are easily avoided if the above technique is adopted.

Sterilized sounds and tubes are introduced after dilatation of the cervix with Hegar bougies. The volume of the sound, of course, does not necessitate dilatation. A packing of sterile gauze holds the sound in place for twenty-two hours. Eight days later a second similar application is given, and this is followed by a third after the same interval of rest. He likes to give the first application at the termination of the time which corresponds to the menses, in order to be able to make the three applications in a fortnight. In case the menses are no longer fixed, he does not hesitate, in spite of hemorrhage, to make the three applications.

The only recommendation that he would offer in regard to the preparation of the patient is that the intestines should be thoroughly emptied.

The immediate results are sometimes pain in the kidneys, but more frequently localized pains in the abdomen, and as in many other applications of radium, a discomfort showing itself in the form of a nauseous sensation, which seldom produces

vomiting, and which stops with the removal of the radium sound. On the day following treatment patients show a slight lassitude, which is of short duration.

While this is the technique made use of, it is always necessary to modify it to suit the case. For instance, the number of tubes used varies with the length of the cavity, the quantity of radium varies with the extent of the hemorrhage; the duration of the application is determined by the thickness of the tube; all of these considerations are based on an analysis of the symptoms, or for other specific reasons. For instance Degrais gives a shorter exposure to radium in certain fibroma cases which had already been treated with *x*-rays without any absolute cessation of the hemorrhage having occurred.

The results have turned out absolutely constant, and the progress of cases has shown great regularity. He has referred to the difficulties incident on the application itself, but they were of short duration, and soon gave place to a sensation of entire well-being; kidney pains, which were sometimes present, lessen, and the patient loses a heavy feeling in the abdomen which is so often present.

As to the hemorrhage itself, the time necessary for its arrest is quite variable. As a general rule, one should not expect it to disappear in the course of a treatment; for often a very free menstrual flow appears after the third application. It is necessary to urge patients to have patience, and to wait for five or six weeks after the last application for the disappearance of all uterine phenomena, whether it be a hemorrhage or an aqueous flow, for the latter often replaces metrorrhagia and menorrhagia for some time after radiation.

There is one serious consideration. Will the arrest of the menses be permanent? Although it may be demanded by women about the time of the menopause as well as by those who have seen the menses reappear, it is not at all the same thing for young women, who have some fear of this artificial and premature menopause. But, fortunately, his experience has shown that women in healthy genital life do not have any permanent cessation of the menses. In four cases which he has been able to follow, and in which the age of the women treated varied from twenty-five to thirty-five years, the menses disappeared for some months, but reappeared again quite normally.

The process of the arrest of the hemorrhage by intrauterine radiation is due, primarily, to changes in the mucous membrane; it can also be caused by an action on the ovary, but when this organ is functioning properly it does not sterilize it permanently. This is of importance from the point of view of an internal secretion and of those troubles which may arise from ovarian atrophy.

It should be noted, in passing, that ailments due to anemia, dyspepsia, nervousness, etc., disappear very soon after the cessation of metrorrhagia, and a much better general condition results.

THE SPECIFIC TREATMENT OF HAY-FEVER.

RACKEMANN, in the *Boston Medical and Surgical Journal* of March 18, 1920, in summarizing his article, states his results in treating ninety-one cases of fall (ragweed) hay-fever are as follows:

Nearly 9 per cent of patients are entirely freed of their symptoms; another 62 per cent are considerably relieved. Of the remaining 28 per cent about one-third showed no relief at all. These results were determined by a personal communication to each patient four to six weeks after the ragweed season. Because this final report was not obtained, nineteen other cases are not included here.

Second, the best results are apparently obtained with a moderate amount of specific treatment, since in these cases even after considerable preparation the tolerance for ragweed pollen extract still remains at a very low level.

Third, systemic reactions occur after 2 per cent of individual injections and are not always due to an overdose.

Fourth, in view of the fact that so few

of the postulates of experimental anaphylaxis hold good for hay-fever, it is probable that hay-fever depends upon a mechanism which is not "anaphylactic" but which is perhaps closely associated with that of drug idiosyncrasies.

TREATMENT OF INFLUENZA AND PNEUMONIA.

In the *Boston Medical and Surgical Journal* of March 18, 1920, DURELL states in view of the prevalence of influenza and pneumonia he feels that a few suggestions, based on his experience at the Brooks Cubicle Hospital, may be pertinent.

We are all agreed that the moving of pneumonia patients in the latter stages of the disease is a most dangerous thing, especially in extreme cold weather and in bad traveling. If the patient has been sick for over three or four days and there is any opportunity to treat him, leave him where he is and give him what little chance he may have. Durell has had some very unfortunate experiences in this matter, several of the patients dying within three or four hours of admission, and one case sent at night from another town one of the coldest nights of the winter found dead in the ambulance on its arrival at the hospital.

The importance of fresh air cannot be too strongly emphasized during the acute stage of the disease, but equally important is the limiting of the air supply and warming the room just as soon as the patient's temperature has become normal. For this reason he believes that the cubicle hospital should be operated in conjunction with a closed one so that the patient may be taken into the closed hospital for convalescence.

For the protection of patients, paper pneumonia jackets, helmets with hoods to come down over the neck and shoulders, paper blankets for lightness and warmth, and plenty of hot-water bottles in the bed.

He believes that a great deal of harm has been done by too frequent examinations of the chest and the consequent exposure.

The importance of water and forced feeding cannot be too strongly emphasized. Above all, keep the bowels open. So many of these septic cases develop an intestinal paralysis that this is most important. If this condition obtains, he has found great benefit from Fowler's solution gtt. v every three hours with enemata of milk and molasses.

Too much stress cannot be laid upon the avoidance of all drugs which reduce the temperature and consequently lower the bodily resistance. Small doses (gr. ij) of Dover's powder will usually make the patient comfortable and control, to some extent, the cough.

He believes that the early use of digitalis and other so-called heart stimulants is a grave mistake because, in the first place, he feels that they do harm, and, more than all, that we should save all of our resources until needed at or near the crisis. In septic cases with streptococcus infection nothing seems to do as much good as strychnia (gr. 1/30) every three hours.

POSTDYSENTERIC COLITIS: THE SEAT OF THE LESION AND ITS TREATMENT.

CANTLIE, in *The Practitioner* for March, 1920, states that the treatment of postdysenteric lesions being within the view of the sigmoidoscope resolves itself into a surgical manipulation. The following is the method adopted by himself:

(*a*) Introduction of the sigmoidoscope without an anesthetic, thereby avoiding all possible sources of danger, for the patient's feelings indicate any danger-point. Push the tube up as far as possible—that is, as far as pain will allow—withdraw the rod-stilette, dilate the rectum above the point by squeezing the air into the bowel from the air bag, and push the tube onward, exposing the mouth of the sigmoid. Wipe the surface gently with a piece of dry cotton-wool held in the sponge-holder.

(*b*) Inspect the surface exposed; there may be ulcers, excoriations, pinhead-sized hemorrhages in the mucosa, or a velvety and edematous appearance of the bowel

surface. The rectal mucosa adjacent may be normal or merely edematous in appearance. If pain allows or the narrowed bowel permits, push the sigmoidoscope onward until well into the sigmoid flexure, when, as a rule, a healthy surface will be found extending from two inches above the lesion at the lower opening of the sigmoid.

(*c*) Now withdraw the lamp, leaving the tube in. Dip the head of the rod-stilette into pure carbolic acid, push it along the empty tube, touching the affected surface at its highest point with the carbolic, withdraw one inch, and after withdrawing the rod-stilette and dipping it again into carbolic reintroduce it as far as it will go along the tube. The whole instrument may now be withdrawn.

(*d*) After two days' time the bowel should be washed out by an enema of salt water every day for four days, then every second day for a week, twice a week for yet another week, and then once a week for, say, a month. The salt water should be sea water wherever that is available. In pre-war days, he got it from the open sea, in either the Havre and Southampton route midway across or in the Harwich and Antwerp route. But a mile out at sea from the coast, except at the Thames mouth, will suffice. The water should be filtered through a towel and then just brought to the boil (really scalding the water (180° F.) is better). Instead of sea water a treble strength of normal saline will do, or the artificial sea water referred to in Martindale's Extra Pharmacopœia. The addition of a tablespoonful of rectified spirit (or whisky, if it can be had) does away with the lowering effect the enema tends to produce.

(e) A teaspoonful or two of castor oil every night at bedtime is the only drug usually required. Should a relapse of mucus, or mucus and blood, occur, the same treatment may be repeated. Should a relapse of true dysentery come on, treatment by emetine until the blood disappears should be given, followed, if necessary, by a 30-grain dose of ipecacuanha repeated for four consecutive days, taking at the same time the usual precautions, when ipecacuanha is given, to avoid vomiting.

(*f*) Except when blood is present in the evacuations ordinary food may be taken, but only one course at a meal. Milk and milk puddings are to be rigidly excluded from the diet, as they should be in all bowel lesions, whether due to sprue or to any of the inflammatory affections. Should a fluid diet be indicated, rice water and not milk is to be given.

STUDIES BEARING ON THE CAUSES OF THE REACTIONS FOLLOWING INTRAVENOUS INJECTIONS OF ARSPHENAMINE AND NEOARSPHENAMINE.

Schamberg, Kolmer, Raiziss and Weiss in the *Archives of Dermatology and Syphilology* for March, 1920, in their conclusions state:

1. The ingenious theory advanced by Danysz that intravascular precipitation of the organic arsenicals is the cause of the reactions (particularly the nitritoid reactions) after intravenous injection is only in part true. It explains the well-known precipitation of solutions of acid arsphenamine (*i.e.*, arsphenamine neutralized to the point of clearing). There is no adequate evidence, however, that precipitation occurs after the use of disodium arsphenamine (hyperalkaline solutions), and there is no evidence at all that neoarsphenamine is ever precipitated in the blood.

2. The mechanism which Danysz sets forth as the cause of the precipitation, namely, conversion of the sodium salt of the drug into the insoluble base through the interaction of the sodium salt with the carbonates, phosphates and other inorganic salts of the blood, is not supported by experimental evidence.

3. Experiments carried out by them indicate that the phosphates of calcium, magnesium, sodium, and potassium, in the concentrations in which they normally occur in the blood, do not precipitate alkaline solutions of arsphenamine and neoarsphenamine *in vitro*, either when tested alone or

in the presence of the other organic or inorganic constituents of the blood.

4. Sodium bicarbonate alone forms a faint flocculation with minute amounts of disodium arsphenamine, but the precipitate dissolves readily on the addition of greater amounts of the latter.

5. Acid arsphenamine precipitates readily in the presence of many of the inorganic salts of the blood; the precipitate, however, disappears when an excess of arsphenamine is added.

6. Solutions containing even double the blood content of inorganic salts in an organic and protein menstruum ("artificial blood") do not form any appreciable precipitates with disodium arsphenamine *in vitro*. A faint flocculation which occurs occasionally with the first drop of arsphenamine disappears when the second drop has been added.

7. Neoarsphenamine is not precipitated by any of the organic or inorganic salts of the blood.

8. We believe that if arsphenamine is properly neutralized, that is, if the disodium and not the monosodium arsphenamine is injected, precipitation *in vitro* can scarcely take place.

9. Experiments on the precipitation of arsphenamine and human blood *in vitro* yielded the following results: (*a*) Acid solutions of arsphenamine in a concentration of 0.25 per cent or more will precipitate in the presence of human serum *in vitro*. (*b*) Disodium arsphenamine is not precipitated. (*c*) Monosodium arsphenamine is precipitated when added in very small quantities to human serum, the precipitate clearing on the addition of larger amounts, doubtless owing to the contained alkali. (*d*) When arsphenamine is dissolved in physiologic salt solution instead of distilled water, the results are not appreciably different. (*e*) Neoarsphenamine even in 40-per-cent solution is not precipitated in the presence of human serum.

10. Experiments carried out on the hemolytic activity of arsphenamine and neoarsphenamine demonstrate that: (*a*) Both acid and alkaline solutions of arsphenamine are strongly hemolytic for defibrinated blood. The use of physiologic salt solution does not especially influence the results. (*b*) The hemolytic activity of arsphenamine varies with its concentration, but is not proportional to it. (*c*) Neoarsphenamine dissolved either in water or in physiologic salt solution, in concentrations ranging from 2 to 4 per cent, is not hemolytic for defibrinated blood.

11. The fact that arsphenamine is hemolytic in practically all of the concentrations in which it is employed, and that neoarsphenamine is not hemolytic except in very dilute solutions (0.9 gm. in 180 Cc. of water), or in extremely concentrated solutions (0.9 gm. in from 2 to 3 Cc.), sheds a degree of illumination on the relative manner in which these drugs are clinically tolerated. Another fact of importance is the hydrogen-ion concentration of these two compounds. The hydrogen-ion concentration of neoarsphenamine is 7.0 to 7.04, which is approximately that of the blood; that of acid arsphenamine is 4.7; while the alkaline solutions are beyond 9.

12. The injections of acid solutions of arsphenamine are prone to produce death, or if less concentrated may lead to the development of a bronchopneumonia as a result of intravascular precipitation of the drug. Concentrated monosodium arsphenamine solutions may, under certain conditions, likewise cause death, or in the event of recovery cause an embolic bronchopneumonia. We have no knowledge that pneumonic symptoms have ever developed after the use of disodium arsphenamine, nor after the use of neoarsphenamine.

13. The injection of cloudy or turbid solutions of neoarsphenamine will almost invariably give rise to severe nitritoid symptoms, in which syncope and shock-like collapse are the outstanding features. No pulmonary symptoms follow. Neoarsphenamine (and of course arsphenamine) should never be administered unless the solution is perfectly clear.

14. Nitritoid reactions may at times follow the injection of a clear solution of neoarsphenamine. As neoarsphenamine is

never in their opinion precipitated in the blood, the elucidation of the cause of such reactions must be sought elsewhere.

15. Their studies lead them to reiterate the view previously expressed by them that the nitritoid reactions are related to some inherent property of the drug. In no other manner could the variation in the incidence of reactions with different lots and different brands of the drug be explained. They believe the cause to be traces of an unidentified impurity which for purposes of convenience and easy reference they have designated Substance X.

FEEDING THE NEW-BORN.

In the *Archives of Pediatrics* for March, 1920, BRADLEY once more reminds us that no method of artificial feeding can perfectly replace maternal nursing. As nearly as possible the different constituents of the substitute milk should resemble those of the mother's milk, both in their chemical composition and in their behavior to the digestive fluids. These conditions are fulfilled only by the fresh milk from some other animal. Cow's milk, for practical reasons, has been found to be the one best suited for the purpose. The chief differences between breast milk and cow's milk lie in the character of the fat, protein, and salts. It has been definitely established that fat plays an important part in the nutritional disturbances of the artificially fed infant. The butter prepared from cow's milk contains 10 per cent of volatile acid, while that prepared from human milk only 1.5 per cent; also the irritant butyric acid glyceride, which occurs in 6 per cent in the butter of cow's milk, occurs only in traces in human milk. The fat globules are much larger than those of human milk. The protein of human milk consists of .59 per cent casein and 1.23 per cent lactalbumin, while cow's milk contains 3.02 per cent casein and .53 per cent lactalbumin. The curd from cow's milk is usually tougher and occurs in larger masses than in human milk, thereby throwing extra work upon the infant's digestion. The salts of cow's milk consist mainly of potassium and sodium bases.

During the first few weeks of life, cow's milk should be highly diluted, boiled, and less sugar added than for older infants. While a highly diluted formula gives a lower caloric value than will meet the infant's requirements, it is important to begin with a dilution not greater than one-sixth to one-fifth of whole milk and to strengthen the formula gradually in order to accustom the infant's digestion to this form of food. The quantity given at birth should be 1½ to 2 ounces, increasing gradually according to age. The same general rules apply as for maternal nursing.

It would be impossible to attempt to discuss all the difficulties of artificial feeding. Every baby's metabolism and digestion is an individual problem, and each case requires observation to determine the formula, interval, and nursing period best suited to its needs. Milk used for artificial feeding should be produced under the best possible conditions from tuberculin-tested cattle. Whenever the financial status of the patient will permit, certified milk should be used, as this is the only raw milk on the market practically safe.

HEMOLYTIC ACTIVITY OF SOLUTIONS OF ARSPHENAMINE AND NEOARSPHENAMINE.

KOLMER and YAGLE, in the *Journal of the American Medical Association* of March 6, 1920, state that while hemolysis *in vivo* may be insufficient to produce appreciable harm, it would appear quite certain not to do good, and it is advisable to reduce as much as possible the hemolytic activity of solutions of arsphenamine and neoarsphenamine; these objects may be attained by observing the following points in technique:

1. By administering neoarsphenamine dissolved in sterile physiologic sodium chloride solution instead of plain distilled water.

2. By preparing solutions of arsphenamine in a saline solution of sufficient strength to render the solution isotonic.

The strength of the saline depends on the concentration of the drug; for example, solutions of 0.6 gm. of arsphenamine in 120 Cc. or more, and of 0.4 gm. in 80 Cc. or more, may be made with physiologic sodium chloride solution, whereas more concentrated solutions require from 0.3 to 0.7 per cent saline as described above to secure isotonic solutions, according to the concentration of the solution of arsphenamine the physician is accustomed to prepare. The strength of the saline is the same for solutions of both the monosodium and disodium salts. Probably sterile physiologic sodium chloride solution may be used for preparing the concentrated solutions of arsphenamine; but the resulting solutions would be hypertonic. These hypertonic solutions, however, are not likely to prove hemolytic, as experiments have shown that solutions of sodium chloride in distilled water may be as high as 7 per cent before producing hemolysis of fresh citrated human blood.

3. By avoiding the intravenous administration of concentrated solutions of arsphenamine for the reasons already given, concentration of 0.6 gm. of arsphenamine in 60 Cc. or less of water or isotonic saline markedly increases hemolytic activity; more dilute solutions, as 0.6 gm. in from 120 to 180 Cc. of water or saline, are much less hemolytic.

4. By giving the injections slowly rather than rapidly, and particularly if concentrated solutions are being administered with a syringe; with slow injections there is more opportunity afforded for dilution of the hemolytic solution of arsphenamine with blood plasma and consequent reduction in hemolytic activity.

5. By avoiding the use of an excess of sodium hydroxide; whether solutions of the disodium salt are less toxic than solutions of the monosodium salt is yet to be determined in a conclusive manner. From the standpoint of hemolysis alone, the solution of monosodium salt (just enough alkali added to neutralize and "clear" the solution) is preferable to solutions to which one-third excess of alkali has been added; probably the practice of adding enough alkali just to neutralize the solution plus one-fifth more will prove the best practical procedure.

They conclude:

1. All solutions of arsphenamine are hemolytic, owing primarily to the direct hemolytic activity of arsphenamine itself.

2. Solutions of arsphenamine in isotonic saline solution are from three to ten times less hemolytic than solutions in water.

3. The hemolytic activity of solutions of arsphenamine in water and isotonic saline is unavoidably increased by the addition of sodium hydroxide for purposes of neutralization; the addition of an excess of alkali increases hemolytic activity.

4. Concentrated solutions of arsphenamine in water and isotonic saline are more hemolytic than dilute solutions.

5. Neoarsphenamine is not hemolytic.

6. Dilute solutions of neoarsphenamine in water, as 0.9 gm. in 90 Cc. or more of water, are hemolytic, owing to hypotonicity of the solution. Concentrated solutions, as 0.9 gm. in 30 Cc. or less of water, are not hemolytic, owing to the presence of sufficient inorganic salts from the drug to render the solution approximately isotonic.

7. To avoid hemolysis in the administration of dilute solutions of neoarsphenamine, sterile physiologic sodium chloride solution prepared of freshly distilled water should be used; when the concentrated solutions are administered (each 0.1 gm. dissolved in 3 Cc. or less), sterile distilled water may be employed.

8. The degree of hemolysis produced by the administration of arsphenamine may be lessened (*a*) by using, instead of water, sterile saline solutions of such strength as to render the solutions isotonic; (*b*) by avoiding the administration of concentrated solutions; (*c*) by carefully neutralizing and "clearing" the solution with sodium hydroxide, counting the drops or otherwise measuring the amount necessary, and adding not more than a fifth of this amount in excess; and (*d*) by giving the injections slowly so as to permit gradual mixing and dilution of the solution with the blood.

INDICATIONS FOR THE REMOVAL OF TONSILS IN CHILDHOOD.

KING (*Ohio State Medical Journal*, March, 1920) sets forth the following indications for tonsillectomy in childhood:

Mechanical obstruction resulting in difficulty in swallowing, speaking, or breathing.

Infection which results in rendering the tonsils, formerly a barrier to infection, a menace to the health of the individual. Some of the evidences of this infection are: Frequent tonsillitis—in these cases a careful examination must also be made of the teeth, accessory sinuses of the nose, and ears; recurrent attacks of bronchitis or laryngitis with diseased tonsils; chronic otitis media or Eustachian tube affection; chronic cervical adenitis; children without many definite symptoms in whom we find definite evidence of tonsillar infection.

INFECTIONS OF THE UMBILICAL CORD.

CREADICK (*Surgery, Gynecology and Obstetrics*, March, 1920) notes that among his 43 cases of omphalitis there were only three mothers who presented a positive Wassermann test as well as a typical histological picture of placental syphilis. On the other hand, in the entire series of cases (2200) which are the basis of this report, there were 29 instances of maternal syphilis without any lesion of the umbilical cord. Furthermore, in 40 instances of omphalitis there was no evidence of syphilis.

Omphalitis, it is clear, appears so frequently in cases without any sign of syphilis that its cause must be sought elsewhere. Fortunately, its origin need no longer be left to conjecture. It depends upon bacterial invasion of the placenta, and the latter lesion generally occurs in cases in which the membranes have ruptured prematurely.

Infection of the contents of the pregnant uterus, as Hellendall has shown by animal experimentation, may occur by three routes: (1) the transamniotic, usually with, but occasionally without, the previous rupture of the membranes; (2) by way of the maternal blood, as in smallpox; and (3) by way of the Fallopian tube from the abdominal cavity, as in appendicitis. To this statement Warnekros adds that in cases of transamniotic infection of the placenta two mechanisms are possible: (*a*) that by which organisms are transmitted through the amniotic fluid directly to the fetal surface; and (*b*) that by which they proceed from the point of rupture of the membranes along their surface to the nearest placental margin.

Premature rupture of the membranes was noted in 26 cases, or 60 per cent of the cord infections. In 13 of these cases rupture of the membranes occurred from eighteen hours to five days before the onset of pain.

It is well known that any factor which tends to lengthen the duration of labor increases the risk of infection. From this view-point the clinical histories of the cases of cord infection present certain significant features, for not infrequently the familiar causes of the prolongation of labor were present. Thus, 16 were primiparæ, and 13 had contracted pelves causing dystocia, though only two of these required operative assistance. In the series there were three breech presentations, three persistent occiput posteriors, and one transverse presentation. In 25 cases the delivery was spontaneous, and in 18 an appropriate obstetrical operation was performed. The duration of labor was prolonged in 25 cases, including 13 of the primiparæ, which represents 58 per cent of the cases in which omphalitis occurred.

Some degree of fever during labor, an outstanding feature of infection, was noted in 22 cases of omphalitis. The temperature varied from 99° to 102° F. In some instances the temperature was not reported, and in others an observation was made only at the very onset of labor. While these data are incomplete, the author's experience teaches that, in the presence of intrapartum fever, infection of the placenta is the rule, and frequently the umbilical cord becomes involved. If fever occurs in conjunction with premature rupture of the membranes and prolongation of labor, infection of the

placenta with extension to the cord becomes almost certain.

The ultimate result for the mother and for the infant in cases of intrapartum fever becomes a matter of the first importance. For the mother it appears that the danger is greatly reduced by the expulsion of the placenta, and usually the temperature falls when the delivery is complete. On the other hand maternal infection may declare itself forty-eight to seventy-two hours after delivery. This was noted in 11 of the cases of omphalitis, but the puerperal sepsis was mild, with no maternal deaths.

For the infant the results are more serious. Fourteen infant deaths occurred among the 43 cases of omphalitis, yielding a mortality of 32.5 per cent. There were eight still-births; three infants died on the first day after birth, two on the second, and one on the fourth day. This very high mortality, it must be made clear, cannot be attributed to the cord lesion, which of itself may become the cause of death only when the cord vessels are thrombosed. Generally the death of the fetus or of the infant is attributable to infection of the fetal blood, although at times it is impossible to determine what rôle an operation to effect delivery has played in the death of the infant.

The value of precaution in the conduct of labor is proved by these statistics, which may be classified chronologically into two groups: (*a*) the earlier, including 1200 cases, pertains to a period when placental bacteriemia was given no special consideration; (*b*) the later, consisting of 1000 cases in which strict precaution was observed—especially the limitation of vaginal examinations—in prolonged labors and after rupture of membranes, except as a preliminary to some operative procedure to effect delivery. In the first group 26 cord infections were encountered with an infant mortality of 42.3 per cent, while in the second group there were 17 cord infections and a mortality of 17.6 per cent. This decrease in the number of infections as well as in their severity the author ascribes chiefly to the substitution of rectal for vaginal examinations.

The author summarizes his important contribution as follows:

In a series of 2200 consecutive deliveries, an inflammatory lesion of the umbilical cord has been found in 43 cases. The lesion is not pathognomonic of syphilis, for (*a*) it was present in 40 cases in which there was no evidence of syphilis, and (*b*) it was absent in 29 cases of undoubted syphilis. The lesion arises by the extension of bacterial infection from the placenta. Bacteria are frequently demonstrable in sections of the cord. The lesion is commonly associated with prolonged labor after premature rupture of the membranes. The frequency of these infections and the resulting infant mortality may be reduced by the use of rectal in place of vaginal examinations.

ABSCESS OF THE LIVER.

CANDLER (*Lancet*, Feb. 21, 1920) holds that the treatment of hepatitis due to amebic infection is hypodermic injections of emetine, which rapidly cause the disappearance of pain, enlargement of liver, and fever. If these symptoms persist it is probable that an abscess is present. In Mesopotamia and India emetine hydrochloride was given hypodermically in 1-grain doses daily, sometimes twice daily for the first few days. The author said that he had heard that some hearts were damaged by too much emetine, but he saw none. It is said to have a cumulative effect, and so the injections are discontinued after ten days and a further course of injections given later if necessary.

If an abscess is present it must be drained either by epigastric or by costodiaphragmatic route. Epigastric draining is usually easy and, provided that the peritoneal cavity is packed off before the abscess is opened, there is little risk of infecting the general peritoneal cavity. Cathcart's method of putting in the drainage-tube on the stretch is useful, as in expanding it closely fits the hole of entry into the liver. It is almost unnecessary to say that as little damage as possible to liver and its vessels is caused, blunt instruments being used. If drainage is made through the thoracic wall, 1½

inches of rib is excised, as in operating for empyema; but before the posterior periosteum at the site of the excised rib is opened, deep catgut sutures are passed by a fully curved small needle, suturing diaphragmatic muscle to intercostal muscle above and below the area of rib excised; by this means the pleural cavity is shut off, and risk of pneumothorax or empyema is diminished; the diaphragm is usually so pushed toward the thoracic wall that the costodiaphragmatic space is diminished, and it is easy to suture diaphragm to intercostal muscles, and also to incise the periosteum and the diaphragm without going through the pleura in many cases. Two medium-sized tubes are better than one large one, as they allow of irrigation later without pressure.

Aspiration of the abscess has been advocated: when the abscess is found by puncture it is aspirated as far as possible, and then a solution of 20 grains of quinine sulphate in 2 ounces of water is injected before the needle is withdrawn.

After-treatment consists in the hypodermic injection of emetine and careful sterility in dressing. The pus is sterile to pyogenic organisms; and if the cavity becomes infected by them there will be prolonged discharge and sinus at any rate. The author believes that the tubes should be removed as early as possible—that is, as soon as the slimy purulent discharge has ceased—usually within a fortnight to three weeks; it is the emetine which will ultimately kill the amebæ, not the drainage, and if the tube is left in long the chances of secondary infection and persistent sinus are increased.

Differential diagnosis mainly concerns malaria and the hepatitis accompanying gall-stones and typhoid. In malaria the finding of the parasite, enlargement of the spleen, and improvement with intramuscular injections of quinine bihydrochloride usually make matters clear, but in the East the patient may have both diseases.

In its early stage, before localizing signs occur, an abscess of the liver may resemble typhoid, particularly when the leucocyte count is as low as 4700, as in one case; in more than one instance patients were observed for a week as doubtful typhoid before local signs of trouble in the liver occurred.

Prognosis depends on the time of diagnosis, treatment, and the amount of liver destroyed. It is astonishing how much liver can be destroyed and yet the patient recover; one patient had an abscess in his right lobe containing two pints of pus. Another had at least one-third of his total liver substance destroyed by a gunshot wound and resulting suppuration; there was only a very slight liver shadow by *x*-ray at the outer right third of his liver; he had an abscess from Poupart's ligament to the scapula; he was emaciated and dangerously ill, but ultimately recovered sufficiently to be evacuated from Salonica to England, having put on a considerable amount of weight. In considering the prognosis, it must be remembered that a second abscess not uncommonly occurs months later.

Death-rate in this disease used to be very high; with the growth of pathology and surgery and the use of emetine the prognosis is greatly improved.

RECENT ADVANCES IN THE DIAGNOSIS OF SURGICAL DISEASES OF THE KIDNEY.

BRAASCH (*Minnesota Medicine*, March, 1920) notes that among the recent advances in technique Weld's discovery that ordinary sodium bromide has all the requisites of an ideal medium for shadowgraphs is of great value. This medium is thoroughly soluble, non-irritating, non-toxic, easily prepared, and inexpensive. Hence pyelography may be employed almost routinely with cystoscopy. There is scarcely a lesion of the urinary tract in which it has not proved of distinct diagnostic value. Since the interpretation of the pyelogram has been quite fully described in recent literature the author does not go into detail concerning the various deformities of the pelvic outline.

With the improvement and standardization of *x*-ray apparatus as well as operative technique, roentgenographic examination of

the urinary tract has become so wide-spread that there are now but few surgeons who do not have access to this invaluable diagnostic aid. In the diagnosis of renal lithiasis much progress has been made in the interpretation of the numerous confusing shadows which appear in the roentgenograms of the urinary tract. Although many of these shadows may be identified by their contour, character, and position, a large number are impossible to interpret without the combined aid of clinical, laboratory, and cystoscopic data.

It is of value to the surgeon to ascertain as accurately as possible prior to operation the exact location of the stone. Approximate localization of the stone shadow in the original roentgenogram is frequently possible, particularly if the outline of the kidney is distinct. By outlining the renal pelvis in a pyelogram and then comparing the position of the stone shadow with that of the pelvic outline, the stone can be localized more accurately than in the ordinary roentgenogram.

Tests of renal function are divided into two general types, excretory and retentive. The excretory test is the simpler of the two and is possibly the more valuable. Of the various excretory tests, the use of phenolsulphonephthalein has proved to be the most practical because of the accuracy of its elimination and ease of its administration.

The phenolsulphonephthalein test as universally employed consists in the estimation of the dye secreted by both kidneys during two hours following its appearance in the urine after intramuscular injection of 1 Cc. Attention should be called to the fact that errors may arise which, unless carefully watched, will largely negate its value. Such errors are of two types, technical and interpretative. If either of these errors occur, the test is not only worthless, but may even be misleading.

Without placing an arbitrary figure which would govern in every case, as a general rule, a patient having a function of less than 30 per cent should be observed very carefully before advising operation. The possibility of retained urine at the time of the test from an overlooked prostate, diverticulum, sacculated ureter, or hydronephrosis must always be considered. However, even though the phenolsulphonephthalein secretion is lower than 30 per cent, it should not necessarily contraindicate operation. It must be remembered that any renal functional test gives an index of renal activity at the time of examination, but not what the kidneys are capable of when pathologic conditions have been corrected.

A differential functional test is the method of estimation of phenolsulphonephthalein secretion collected from the individual kidneys by means of the ureteral catheter during a period of from fifteen to thirty minutes following intravenous injection. Primarily the test was used to determine the state of efficiency of the supposedly well kidney. It is, however, of even greater value as an aid to diagnosis of renal lesion. As with the combined test, the possibilities of error in technique and interpretation must be considered. It is necessary that the dye be injected intravenously and not intramuscularly, otherwise the rate of secretion will be greatly retarded. If given intravenously the dye will appear in the urine within four or five minutes after injection, and an average of 15 and 30 per cent is secreted from each normal kidney in fifteen and thirty minutes respectively.

The value of methylene blue and indigo carmine as an aid to ascertaining renal function must, however, also be recognized. As a rough test, particularly when one or both kidneys cannot be catheterized or when it seems inadvisable to do so, it may be invaluable. Thomas has recently added to the value of the blue test by his method of making a quantitative estimate of the dye secreted. It is, however, not of such diagnostic value, nor is it so accurate in ascertaining the degree of renal function, as the phenolsulphonephthalein test.

Estimation of the degree of retention in the blood of metabolic end products such as uric acid, urea and creatinin has of recent years been placed on a practical basis. This is largely the result of the work of American investigators such as Folin and Denis,

Marshall, Myers and Fine, and others. The estimation of the urea nitrogen content of the blood has been most widely employed in surgical conditions of the urinary tract. It is generally recognized that an estimation of 40 mg. of urea nitrogen for each 100 Cc. of blood would indicate a guarded prognosis, and when it reaches more than 100 mg. the prognosis is very grave. More recently it has been found that creatinin, when retained in the blood in amounts of more than 2.5 mg., is indicative of renal disease, and, when more than 5 mg. are retained, the termination is usually fatal.

Probably the most important recent contribution to the bacteriology of the kidney is that made by Cabot and Crabtree, who have demonstrated that the clinical course of an infectious renal lesion is largely dependent on the identity of the bacteria. The colon group of bacilli tends to produce non-suppurative renal changes, while the pathogenic bacteria, notably the cocci, tend to produce suppurative nephritis and abscesses. Lesions caused by the colon group are usually non-surgical and, in the early stages, are amenable to treatment, whereas a coccus infection of the kidney is distinctly a surgical condition. The coccus infections usually predominate in the cortex. The importance of making a bacterial investigation of the urine in cases of acute renal infections is self-evident.

END RESULTS FOLLOWING OPERATION FOR THE RELIEF OF CHRONIC APPENDICITIS.

STANTON *(New York State Journal of Medicine,* March, 1920) notes that pain is the most constant symptom of chronic appendicitis. The primary pain of acute appendicitis is almost always located in the epigastrium or mid-abdomen. Similarly, in cured cases of chronic appendicitis the pain had been almost constantly referred to as epigastric or mid-abdominal rather than right inguinal. On the other hand, nearly all the patients not benefited by operation complained of right inguinal pain as one of their chief symptoms.

Most of the writers have spoken of constipation as one of the chief symptoms of chronic appendicitis, but in our cured cases constipation has not been more prevalent than in the ordinary run of office patients, and removal of the appendix has had no constant effect upon this condition. As will be noted later, a large group of uncured patients with pain in the lower right quadrant suffered from chronic constipation, and neither the pain nor the constipation was benefited by removing the appendix. Several patients who sometimes had spells of sudden diarrhea following soon after the onset of their painful attacks, were cured of the diarrhea after removal of their appendices, a fact previously noted by Ewald and others.

During the past eight years 86 per cent of the patients the writer operated for chronic appendicitis have been definitely cured by the operation.

The uncured patients have for the most part fallen into two rather sharply defined groups. The larger group is typically represented by the young woman who haunts the surgeon's office complaining of right inguinal pain usually associated with varying degrees of constipation. The type is familiar to all. Fatigue or constipation or both are usually given as causes of increased pain. Many of them say that they have been repeatedly treated with the ice-bag for supposed attacks of acute appendicitis. A carefully taken history fails to reveal the first two of the cardinal symptoms of appendicitis, namely, the cramp-like diffuse or mid-abdominal pain and nausea.

The great majority of these cases present at operation a normal appendix and an enlarged, movable cecum of the type described by Wilms, Stierlin, and others.

The author emphasizes the fact that in eleven years of operating he has never cured a single one of these cases by appendectomy, nor has he ever learned of a convincing case of cure by another surgeon.

These cases are readily relieved by proper corseting, abdominal exercises, hygiene, and cathartics. Occasionally it may be justifiable to remove the appendix to eliminate

doubts and retain control of the patient, but it should not be done with any idea of direct benefit from the appendectomy itself.

The second rather poorly defined group of uncured cases is composed of patients operated in the hope that the appendix might be the cause of various obscure gastrointestinal symptoms. In the absence of typical appendix symptoms these operations have been uniformly failures. Surgeons and *x*-ray specialists have talked knowingly about pyloric spasm and its relation to chronic appendicitis, but to date the author has failed to find a case which would stand the acid test of the end-result investigation. Such authorities as Ewald and Moynihan have claimed that almost every conceivable form of dyspepsia might be caused by the appendix.

Chronic appendicitis has proven to be a rather sharply defined disease in which the symptoms may be recognized by the fact that they reproduce in miniature the first symptoms of the acute attack. The disease differs from the acute appendicitis by the fact that the obstruction is incomplete or because it is habitually relieved before the acute inflammatory stage develops. The pathologist's report, based on the microscopical examination of so-called appendices, is unreliable. Most chronic appendices producing symptoms may be recognized at the operating table by the presence of gross anatomical factors predisposing the appendix to attacks of partial or complete obstruction of the lumen.

VINCENT'S ANGINA.

THEISEN (*New York State Journal of Medicine,* March, 1920) notes that while it is now an accepted fact that the finding of the fusiform bacillus with the spirillum or spirochete, in smears from throat swabs, makes the diagnosis of Vincent's angina easy and positive, it must be remembered that this bacillus is not the specific organism of Vincent's angina only, but is found also in cases of mastoiditis, bronchopneumonia, diphtheria, hospital gangrene, throat syphilis, and stomatitis. Cultures and smears usually show mixed infections with other organisms such as the Klebs-Loeffler, pneumococcus, streptococcus, and staphylococcus. Mistakes in diagnosis are sometimes made because only cultures are taken, and not throat swabs. The diagnosis is easily confirmed in Vincent's if smears from the throat swabs are examined microscopically. The fusiform bacillus is practically always associated with the spirillum or spirochete. The spirochete is a thin spiral from six to twenty microns long, and two to four microns wide. The fusiform bacillus is a rod-shaped organism from four to twelve microns in length and two to six microns in width. Both these organisms flourish around decayed teeth, in diseased tonsils, and in ulcers. Both organisms stain readily, among the best reagents being methylene blue, carbol-fuchsin, and gentian violet.

Bad teeth, with the attending spongy condition of the gums, are among the most important etiological conditions in cases of Vincent's angina. If cases are seen from the onset, before ulceration takes place, the entire clinical course of the disease can be studied. A thin grayish pseudomembrane forms on the gum, particularly around a decayed molar, and extends to the tonsils, and often to the mucous surface of the cheek. In a few days, unless treatment is immediately effective, a superficial ulceration forms under the membrane, and in some cases there is swelling and tenderness of the cervical glands on the same side. In the favorable cases, and if radical treatment is promptly started, the condition can be limited to one side, although in many cases it becomes bilateral.

The onset of the disease is fairly sudden, being sometimes ushered in with a chill and temperature elevation. In children this often reaches 104° and 105° F. In adults the temperature does not run as high as a rule, except in the worst type of the disease, with deep destructive ulceration. In this class of cases there is also very marked prostration, with headache and very painful deglutition. This is at times so severe that

it is difficult for the patient to get sufficient nourishment. Suppuration of the cervical glands is rare, but has been seen by the writer.

In the favorable cases, the mild form, the course of the disease is not longer than from a few days to two weeks. Recurrences, in the same patient, are not unusual, and are mainly caused by neglect in correcting the underlying causes, dental caries, diseased tonsils, pyorrhea, and improper care of the mouth generally.

Halsted, in his very complete paper (*Trans. A. L. A.*, 1912), states that there are two distinct clinical types of the disease, the one form to be differentiated from diphtheria and other non-diphtheric pseudomembranous anginas, while in the other form localized ulceration simulating syphilis very closely is present.

The second type mentioned by Halsted occurs almost exclusively in adults, while almost all authors agree that the first type, simulating diphtheria and other membranous conditions, particularly those in which the streptococcus predominates, is far more frequent in young people.

The one constant symptom is the peculiarly offensive and distinctive odor, which in the severe ulcerative form is almost unbearable. The diagnosis can almost be made by that alone. The fact that the type of the disease in children so closely resembles diphtheria accounts for many of the mistakes in diagnosis, because in this type cultures only are examined, and not smears from throat swabs.

In the Michigan State Laboratory, in 1909-10, out of six hundred and eighty-seven throat swabs sent in to be examined for diphtheria, one hundred and seventy-eight were not cases of diphtheria at all, but proved to be Vincent's angina. A clinical diagnosis of diphtheria had been made in two hundred and twenty-four of the six hundred and eighty-seven cases, but the bacteriologic diagnosis proved that only one hundred and twenty were true diphtheria cases.

Forty-six of the cases clinically diagnosed as diphtheria proved to be Vincent's angina. Vincent himself found the disease in two per cent of all cases of membranous anginas. Lublowitz found the specific organism in six out of thirty-eight cases of ulcerative stomatitis. Rodella found them in about one-third of all the pseudomembranous anginas he examined. Fatal cases are not as uncommon as is generally believed, and in children some cases, in which a diagnosis of laryngeal diphtheria had been made, and in which the Klebs-Loeffler bacillus was not found, were undoubtedly cases of the ulcerative type involving both the pharynx and the larynx. These are always serious, and in children, when a pseudomembrane is also present in the larynx, are sometimes fatal.

All cases of Vincent's, if they could be seen from the onset, are simple and yield to treatment readily.

The severe ulcerative and fatal cases were either not seen early enough for treatment to be effective, or, as often happens, did not consult a physician until the disease was far advanced.

The disease, if not treated promptly, or if treated for some other throat condition, advances rapidly to deep destructive ulceration, often involving the entire pharynx and adjacent mucous surfaces.

There is an intermediate form of the disease between the simple pseudomembranous form, seen usually in children, and the destructive malignant type just described. In this variety, which has usually been going on for a week or ten days, before seen by a physician, the ulcerative process is not nearly as extensive. It may be confined to only one tonsil and the mucous membrane in the immediate vicinity, or both tonsils may be involved.

The treatment by arsenic is of course well known; it has almost a specific action in some cases.

A strong solution of potassium chlorate, powdered alum, carbolic acid, glycerin and water, is of great value and clears up the throat lesions quicker than anything else. It is used as a gargle, for adults and children old enough to use gargles. In very young children it is used as a spray, the

strength of the solution varying with the age of the patient.

After an attack the mouth should be carefully examined, and all bad teeth and diseased tonsils removed.

Proper care of the mouth and throat is of the greatest importance. A 20-per-cent alcoholic, Seiler's or Dobell's solution, if used several times daily, will not only prevent attacks of Vincent's angina, provided of course that the usual predisposing causes have been removed, but will go far in rendering immunity for most all anginas and other infectious throat conditions.

Vincent's angina is really a very common condition, and if we are on the lookout for it, it will be found much more frequently than we think.

THE SURGICAL TREATMENT OF TRIFACIAL NEURALGIA.

ADSON (*Northwest Medicine*, January, 1920) after stating quite frankly that the etiology of this condition is unknown, and giving the technique of alcoholic injections, observes that with improved methods of surgical treatment operation is the method of choice. Hemorrhages are controlled by the use of a knot-tier for the ligation of the middle meningeal. A ganglion retractor equipped with a small light is helpful for the exposure of the ganglion, and small dental packs are used in dissecting the dura from the bone. Paralysis of the ocular muscles may be avoided by holding the dura taut and not resting the ganglion retractor on the cavernous sinus. By making the skin incision 3 cm. posterior to the external angle of the orbit, the frontal branch of the seventh nerve is left uninjured. Paralysis of the seventh nerve has been avoided also by not stripping the dura over the petrous bone, and by cutting the posterior root instead of avulsing it, thus preventing injury to the pons. Ankylosis of the jaw is rarely seen since the adoption of the posterior incision, as the temporal muscle is thus split instead of incised. The occurrence of trophic interstitial keratitis has also been greatly lessened, since the dura propria is not opened except over the posterior root where the fibers are cut, in this manner eliminating extensive exposure of the ganglion and avoiding injury to the ophthalmic portion of the ganglion, which either has a trophic supply to the cornea, or sympathetic communications with the carotid plexus protecting the cornea against ordinary irritations and slight abrasions.

The patient is placed in a semierect position with the head on a special head-rest, which may be raised or lowered to the position desired. A general anesthetic is used. The anterior limb of the question mark incision over the temporal region and down in front of the ear to the zygoma begins 3 cm. posterior to the external angle of the orbit and 3 cm. above a line drawn parallel with the zygoma. The skin flap is turned forward and the fascial flap covering the temporal muscle is turned backward, both being carried down to the zygoma. The temporal muscle is split and the skull exposed by a mastoid retractor. A subtemporal decompression is done, and an area of bone about 3 cm. by 3 cm. is removed. The dura is gently elevated from the middle fossa until the meningeal artery, which the author prefers to ligate, is exposed. The foramen is plugged with bone wax, followed by further elevations of the dura until the posterior margin of the third branch appears. Dissection is then carried posteriorly and inward, exposing only the posterior margin of the ganglion; the dura propria is not opened until the region of the posterior root is reached, thus avoiding injury to the ganglion, particularly of the inner portion, the cells controlling the ophthalmic branch. Before the dura propria is opened directly over the posterior root, all bleeding is controlled. The dura covering the brain is held under gentle tension and the cavity is well illuminated by means of the ganglion retractor.

After the dura has been opened, the fibers of the posterior root are gently exposed and slightly elevated, and the guillotine knife is slipped over the fibers which are to be cut; thus any trauma of the pons or brain stem is avoided. The cavernous

sinus is rarely injured, inasmuch as all the anatomic marks may be seen clearly. The fibers of the posterior root just above the ganglion are turned down over the ganglion, while the proximal fibers are pushed back into the posterior fossa. A small pledget of muscle is inserted into the dura foramen as a plug; this assists in making a barrier between the severed ends and prevents the extensive loss of cerebrospinal fluid that usually follows when the patient recovers from the anesthetic. If there is any danger of bleeding, it is well to insert a narrow strip of iodoform gauze, and remove it on the third day. The muscle and fascia are closed with interrupted sutures of chromic catgut No. 1. The skin is closed with interrupted sutures of silk, which are removed on the fifth day. During the operation the eyelid is closed with adhesive, which is replaced by a Buller's shield before the patient leaves the operating-room. The shield is worn for a week or ten days and subsequently is exchanged for close-fitting automobile goggles, to be used whenever the patient is exposed to wind or dust. In addition to wearing goggles, the author advises irrigations twice daily with 2-per-cent boric acid solution.

THE PRODUCTION OF IMMUNE SERUM AGAINST ANAEROBES CAUSING GAS GANGRENE.

FASIANI (*Arch. ital. di chir.*, 1919, i, 37) notes the confusion in regard to the classification of the pathogenic anaerobes, many workers in bacteriology describing under different names bacteria which in reality are identical organisms. The great number of gas gangrene infections during the war gave impetus to research concerning their etiology. Fasiani has endeavored to classify the principal organisms causing gas gangrene into three groups:

A non-motile anaerobe, known before the war and described as bacillus perfringens, bacillus phlegmonis emphysematosæ, and bacillus aerogenes capsulatus.

A motile spore-forming anaerobe described as bacillus edematiens maligni and vibrion septique.

A group of motile, spore-forming anaerobes, found for the first time during the war and described by various authors as bacillus edematiens, bacillus bellonensis, bacillus anonimo, and bacillus dei gascedem.

There are numerous types belonging to each of these groups. Fasiani isolated 75 different strains from cases on the Italian front. Sera against each group were prepared by injecting the organisms intravenously into horses. The immune sera were then tested for various and the protective and curative properties. The results may be summarized as follows:

Immune sera against Groups 1 and 2 contain precipitins, agglutinins, and antitoxins, but no properties when used in animals. Complement fixation does not occur. The best serum is obtained by the use of organisms in culture, a total culture being given intravenously.

Immune serum against Group 3. This was prepared like the serum against Groups 1 and 2, but the use of toxin as an antigen is more practical and clinically more efficacious. The resulting serum contains precipitins, agglutinins, and antitoxins. It causes complement deviation but has no antimicrobic properties.

The protective and curative power of the serum was not tested in man, but gave excellent results in laboratory animals.—*Surgery, Gynecology and Obstetrics*, March, 1920.

GENITO-URINARY TUBERCULOSIS TREATED BY MASSIVE DOSES OF TUBERCULIN.

CREASY (*Lancet*, March 6, 1920) observes that it is common experience, if we except such radical treatment as the removal of kidney or testicle, that the amount of good we can do to cases of tuberculosis of the genito-urinary system is very small, consisting mainly in the prescribing of sedatives to allay the most distressing symptoms. The administration of tuberculin, in accordance with certain methods, may relieve many patients from wretched suffering, constant pain, and the

wearying anxiety of frequent micturition night and day. The relief may amount to cure, and in most of the cases with the relief of symptoms there have come great improvement in general health and marked increase of energy. Many cases had been under treatment for varying periods in hospitals, and had found no relief; it is in these patients that reviving hope has been of much assistance toward rapid improvement.

In the light of experience gained from these cases many sufferers from genito-urinary tuberculosis, if coming under treatment by tuberculin sufficiently early, and in accordance with a suitable technique, are susceptible of great improvement. The tuberculin test having proved positive the treatment should be commenced forthwith. There should be no delay until tubercle bacilli are found in the urine, although cases of long standing will apparently respond well and can be arrested in their otherwise downward course. Prognosis is much improved when these early cases are given gradually increasing doses of different preparations of tuberculin over a period of six months to a year. A second or third course may be required after intervals of varying length, and there can be no attempt to lay down exactly a routine treatment for any and every patient.

The technique employed in the reported cases was the following: The injections, which were subcutaneous and usually in the upper arm, were given twice weekly, the weight being recorded and the patient taught to take and record his temperature four times a day. The treatment can be carried out at any distance from the physician's house, the dose being prepared after study of the temperature and weight record, which should be sent twice a week to the physician, when the proper procedure can be indicated to the medical man in private charge of the patient. In this way the treatment need not interfere with the patient's daily occupation; where necessary and in old-standing cases two or three courses of injections can be spread over several years, while the word "cure" should be used concerning no patient until he or she has lost all symptoms and no longer reacts to tuberculin.

Unsuitable cases for the treatment are found to be the following: (1) Those in which any continued fever is present; such fever is caused by mixed infection, and the patient should be kept in bed till the temperature is normal. (2) Albuminuria; no injections should be given. (3) Epilepsy; in such cases it is as well to decline treatment. Pregnancy is no bar to the treatment.

A common lesson to be drawn from the cases reported is that early cystoscopic examination along with testing by tuberculin should be practiced in every suspicious case. All should be treated, even those of long standing. Treatment can be carried out at dispensaries. As a great economic gain to the community, patients are usually being able to continue their work.

The attendance of patients twice a week is essential for the proper progression of doses. Neither patient nor physician should be afraid of reactions. The high temperature with unpleasant symptoms for twenty-four hours leads to no harm, and, in point of fact, is an invariable prelude to improvement.

GENERAL ANESTHESIA BY INTRA-RECTAL ETHERIZATION.

MANINE and LE PAGE (*Arch. de méd. et pharm. nav.*, 1919, cviii, 284) state that while many surgeons have refused to employ rectal etherization owing to the possibility of severe complications, sometimes fatal, which have been attributed to this method, they believe, on the basis of their own experience, that it is dangerous only if doses greater than from 60 to 100 Cc. are used. Further experience and perfecting of the technique, however, are necessary before a definite opinion as to its true value can be formed.

The authors have employed the method in 16 cases. In only one was there a mishap, and this was in the case of a patient

whose general condition was very unsatisfactory. Twenty minutes after the operation was begun the respiration ceased, the skin became markedly cyanotic, and the pulse weak. Artificial respiration and the injection of stimulants revived the patient, however, and the operation was completed without further incident.

Intrarectal etherization is described as follows:

One centigramme of morphine is given half an hour before the operation. The patient is then placed on the left side and a No. 16 Nélaton catheter is introduced into the rectum for about 10 cm. According to Dufourmentel, the fluid should not be injected into the colon. If the general condition is good, as much as 100 Cc. may be injected. Otherwise the amount should not exceed 80 Cc. With the smaller dose anesthesia is slow, but may be hastened with a few whiffs of chloroform.

The authors have always used pure ether rather than ether mixed with oil, and have never observed irritation of the rectal mucosa or any other inconvenience. Anesthesia is complete at the end of twenty-five or thirty minutes. The awakening is slow, in the authors' cases taking place from one and a half to two and a half hours after the beginning of the anesthesia.—*Surgery, Gynecology and Obstetrics*, March, 1920.

CONGENITAL PYLORIC STENOSIS.

STRAUSS (*Surgical Clinics of Chicago*, February, 1920) notes that he has operated upon 103 cases with only three deaths. He regards fluoroscopic examination as a most important means of making an accurate diagnosis. He claims it is exact, since of 55 cases classified as medical cases, not one has required surgical procedure.

The author believes that the condition begins during fetal development of the stomach.

The pyloroplasty has as its object the transformation of the pathologic form of pylorus into a normal one. The pyloric tumor shows on cross-section that it has first an infolding of its mucosa, and second, a tumor composed of hypertrophied smooth muscle. In order to reconstruct this pylorus to normal we must unfold the infolding mucosa by shelling it out, and second, reduce the muscle tumor by using it as a plastic flap.

Through an inch incision the pylorus is exposed, the tumor drawn out through the opening and the muscle cut across, beginning well up on the stomach, following there the lines of cleavage between the muscularis and mucosa, the chief part of this dissection being done by a blunt instrument. The flap of muscle is turned back, the bulging mucosa sutured to it, and the whole area covered by a flap of omentum.

THE TUBED PEDICLE IN PLASTIC SURGERY.

GILLIES (*New York Medical Journal*, Jan. 3, 1920) evolved his principle when confronted with the difficulties in restoration in severe facial burns. Since no facial flaps were available recourse was had to the chest and neck. When they were taken from these regions much difficulty was encountered in securing an adequate blood supply.

Supposing it is desired to graft a large area of skin of the chest to the face, it is necessary to have a pedicle to the flap of skin whose base is situated somewhere at the upper part of the neck.

A strip of skin, usually between two and one-quarter and three inches in breadth, is raised from the neck to form the pedicle, its upper and lower extremities being left untouched. Two edges of the pedicle are accurately sutured together, skin edge to skin edge, by a continuous suture. Subcuticular catgut is perhaps the most effective suture material, but in the majority of cases an ordinary continuous horsehair is used.

It is usually possible to undermine the edges of the wound which is caused by the removal of the flap by raising the pedicle sufficiently free to obtain approximation beneath the pedicle. This is facilitated by

raising the shoulder and inclining the head toward the affected side. Tension sutures in addition to the skin-edge sutures are required to obtain union. The pedicle, now tubed, lies like a sausage between base and extremity.

In the course of some three weeks considerable arterial and venous anastomosis has occurred in the pedicle, and the circulatory fluids are led from the base of the pedicle toward the chest extremity. The flap may now be raised from the chest and sewed into position on the face, the pedicle being left in its tubed condition. In this maneuver it is obvious that the pedicle cannot become infected. It will stand a considerable amount of twisting and even kinking, and the blood supply of the flap is enormously improved.

When the flap has taken root on the face the pedicle may be divided and returned to the neck, or, as is more commonly the case, the pedicle is divided at its neck end, opened out until it remains flat, and spread on some other portion of the face. Once having placed the flap onto the face, it is possible to use the pedicle in a variety of ways and positions.

Flaps of skin can thus be brought, by stages, from a long distance to the face. In other parts of the body which are the site of severe burns and contractions, larger flaps of skin may be used to relieve the disability by this method.

LIFE EXPECTANCY OF PATIENTS FOLLOWING OPERATION FOR GASTRIC AND DUODENAL ULCER.

BALFOUR (*Annals of Surgery*, 1919, lxx, 522) says that life expectancy is the major consideration with the patient, particularly in diseases of the gastrointestinal tract for which operation has been carried out. Recently the records of the Mayo Clinic have been utilized by the Actuarial Society of America under the direction of Mr. Arthur Hunter, who determined as accurately as possible the life expectancy of persons who have been operated on for gastric and duodenal ulcer.

A study was made of the 2431 patients operated on in the Mayo Clinic between the years 1906 and 1915. It is remarkable that of this group of cases the Society failed to trace only 108. The study was made without any regard to the type of operation performed. It shows, first, that the operative mortality from all causes in 545 cases of gastric ulcer in which operation was done during this period was 4.5 per cent, while in 1684 cases of duodenal ulcer the operative mortality from all causes was 2 per cent. Gastric ulcer carries, therefore, twice the operative risk of duodenal ulcer.

The Society's investigations of the mortality in the years after operation show the following facts:

Gastric ulcer: Five hundred and twenty-one patients were under observation on an average of three and six-tenths years, and in that time 88 (17 per cent) died from various causes.

Duodenal ulcer: One thousand, six hundred and fifty-one patients were under observation on an average of three and four-tenths years, and in that time 85 (approximately 5 per cent) died from various causes.

Gastric and duodenal ulcer: Ninety-one patients were under observation an average of three and eight-tenths years, and in that time 9 (10 per cent) died.

Hunter's first observations on these statistics are as follows: The fact that 17 per cent of those operated on for gastric ulcer have died within an average period of observation of three and six-tenths years, and the fact that 5 per cent of those operated on for duodenal ulcer have died within an average period of observation of three and four-tenths years, are in themselves significant. While we cannot tell how many lives have been saved by reason of operation for duodenal ulcer, it may safely be stated that the survival for three and a half years after the operation of 95 per cent is a high tribute to surgery. With such a serious condition as gastric ulcer, a death-rate in three and a half years of 17 per cent of those operated on appears to

be low. While Balfour cannot prove his statement, he believes that a much larger proportion of persons would have died but for the operation, and that many years of life in the aggregate were saved through surgical treatment.

The chief point of importance in these statistics, however, is gained by comparing the mortality figures of a group of patients subjected to operation for gastric and duodenal ulcer with a group of the general population corresponding in age and in sex.

TABLE I.

Deaths in group of 521 persons operated on for gastric ulcer:

Years following operation.	Deaths.
First	26
Second	21
Third	11
Fourth	7
Fifth	7
Sixth and subsequent	6
	88

Deaths during the same period of time in general population group of 521 persons with like distribution as to age and sex:

Years.	Deaths.
First	8.2
Second	6.5
Third	4.9
Fourth	4.1
Fifth	3.0
Sixth and subsequent	5.6
	32.3

The statistics show that the death-rate of a group of persons following operation for gastric ulcer is four and one-third times as high as that of a group of the general population of similar age and sex. In the second year the death-rate is three and one-fourth times as high, and in the later years still less. The death-rate of patients operated on for gastric ulcer, as determined by the statistics of about three and one-half years, was two and two-thirds times the death-rate in the general population group.

TABLE II.

Deaths in group of 1651 persons operated on for duodenal ulcer:

Years following operation.	Deaths.
First	22
Second	20
Third	9
Fourth	10
Fifth	11
Sixth and subsequent	13
	85

Deaths during the same period of time in general population group of 1651 persons with like distribution as to age and sex:

Years.	Deaths.
First	24.0
Second	18.6
Third	14.3
Fourth	11.2
Fifth	8.3
Sixth and subsequent	16.7
	93.1

The death-rate of a group of persons in the first two years following operation for duodenal ulcer is only that of a group of the general population, and after the second year the mortality is actually less than in the group of the general population. These statistics illustrate very strikingly the fact which has been always recognized by surgeons, namely, that gastric ulcer is a much more serious condition than duodenal ulcer, not only from an operative standpoint, but from the standpoint of after-results, and that as a rule the patient with a gastric ulcer shows much more evidence of impaired general health than the patient with duodenal ulcer.—*Surgery, Gynecology and Obstetrics*, March, 1920.

THE PROSTITUTE IN JAIL.

GOODMAN (*Medical Record*, March 20, 1920) observes that at the Hospital Jail of Ponce, 43 women among the 332 confined, or more than 12 per cent, had infectious syphilitic lesions. The lesions had all been neglected, and none of the patients had had any treatment prior to admission. The percentage of women who were without lesion, but who had + + + + Wassermann test, was 42. The syphilitic index was 50 per cent, since 165 of the 332 women were positive clinically and serologically.

At Arecibo, 332 women gave 20 per cent active infectious syphilitic lesions, and 70 per cent gave four-plus Wassermann reactions.

At three jails, 12 per cent of the women had dangerously infectious syphilis. Forty-two per cent had four-plus positive reactions.

The author holds that he has given new

force to the commonly accepted belief that the main source of infection is the prostitute; that with her isolation new cases of syphilis among the men of the community and from these to the women and children cease.

After six months in camp, during which time the number of enlisted men rose from 250 to 12,000, only 20 new cases of venereal infections were acquired, of which four were syphilitic infections.

VERTIGO.

SCOTT (*Lancet*, March 6, 1920) notes that by a variety of ways, such as whirling motion followed by sudden change of rate, we can in normal healthy individuals evoke the sensations and manifestations of vertigo. Syringing the ears in a certain way, the application of hot or cold draughts of air to the region of the ear, the passage of electric currents through the head, can all be made to evoke vertigo.

Certain diseases are accompanied by giddiness or dizziness, forced movements and staggering gait, often associated with nausea or vomiting. Sometimes faintness with clammy sweat and collapse are outstanding features of the reaction set up in the vertiginous state.

Many patients with vertigo are found to have a high blood-pressure. In others the blood-pressure is considered to be too low. Some are found to have signs of renal disease, such as would indicate certain forms of so-called Bright's disease. When no definite signs of cardiac, gastric, or renal disease can be discovered, recurrence of vertigo may be suspected to be due to visual errors, and the more so when visual disturbances associated with giddiness form a prominent complaint. Some error of refraction, if found, is then corrected. Should attacks recur, it would seem instinctive in many to suspect some obscure disease of the brain, and particularly of the cerebellum, as the probable cause of the symptoms.

Sir William Gowers stated that in his extensive clinical experience vertigo was associated with some aural disturbance or disease in 99 cases out of every 100 who consulted him with this complaint.

It is common knowledge that wax in the ear sometimes causes giddiness until it has been completely removed.

It is becoming familiar, certainly to aural surgeons, that chronic infection of the temporal bone may lead to erosion of the labyrinth and set up giddiness, which is cured by removal of the disease in the cavity of the middle ear which produced the erosion of its walls.

It has become recognized that it is the duty of the surgeon to distinguish those cases of erosion of the bony labyrinth without infection from those with infection and destruction of the membranous labyrinth, for he must in the latter case be prepared to follow the disease into the labyrinth by opening and efficiently draining the vestibule and semicircular canals, but should generally withhold his hand if the labyrinth responds to stimulation.

Spontaneous vertigo in the course of active middle-ear disease is often, but not always, an imperative and urgent call for surgical intervention. When the vertigo is rapidly followed by signs which indicate that the labyrinth has become completely defunct, we must recognize that we are faced with those manifestations of infective labyrinthitis which generally lead to fatal basal leptomeningitis if nothing be done.

The author has been able to trace at the bedside the progress of infection from the ear, through the labyrinth to the basal meninges, and so to the post-mortem table. But its fatal progress can be stayed when passing through the labyrinth if we recognize the significance of the giddiness, character of the nystagmus, forced or erroneous directional movements of the limbs. And we have learnt that the patient may be saved from fatal meningitis by timely drainage of the labyrinth.

So much for the value of vertigo as a sign. Even in meningitis, given the case early, by draining the basal meninges through the labyrinth life may be saved.

Ménière's one and only post-mortem case

of vertigo which revealed any abnormal signs was one which is now recognized as infective streptococcal labyrinthitis with intensely hypervascular membranous semicircular canals which to the naked eye resembles a blood-clot, but which really consists of inflamed and engorged tissues infected by long-chained streptococci. The commonest variety of Ménière's disease proper is a non-hemorrhagic and non-infective disturbance of the intact and normally reacting labyrinth. This is so in the vast majority of cases which we meet with in ordinary clinical practice. The symptom-complex is easily recognized. There is generally, but not invariably, a certain defect in hearing with tinnitus. Perhaps the attacks occur more frequently after a common cold in the head, or influenza, and are ascribed by the patient to his or her being "out of sorts" or "run down." Sometimes the patient is the subject of chronic catarrh of the nose or throat, which may have lasted for years and may be associated with dyspeptic disturbances and perhaps hypochondriasis. The onset of vertiginous seizures is apt to be put down to a "touch of the liver," but its mechanism is unexplained. The patient may actually be under treatment for nasal polypi or some other affection of the accessory sinuses of the nose or throat when troubled with dizziness, staggering, and often nausea, but he rarely regards these maladies as being connected with the cause of the giddiness.

The cause, often so subtle to find, and consequently so often overlooked, though admitted as the cause when recognized, is in the author's experience simply unilateral Eustachian inefficiency. It can be proved by looking at each drum while the vertiginous patient attempts to inflate his ears, and noting that one or both fail to expand. The disturbance caused by Eustachian inefficiency is better known to those who are familiar with the effect of passing through sudden changes of atmospheric pressure, as in a caisson. Divers know to their anguish the pain in the ears caused by entering the compression chamber with a cold in the head, which prevents equalization of pressure on the drums; giddiness, staggering, or vomiting may occur. The Eustachian tubes are normally closed, except during the act of swallowing, when they should open for the fraction of a second and close again like the shutter of a camera.

It is when the tubes fail to open through some inefficiency, such as is produced by congestion or swelling of the mucous membrane due to a cold or catarrh, or when blocked by tenacious mucus or by temporary engorgement of the blood-vessels which supply the pharyngeal end of the tube, that the regulating action fails. A too tight collar in some is known to produce the same result. Why is this mechanism necessary? Because, as the author has shown from laboratory experiments, a sudden change of pressure from low to high or high to low in the normal labyrinth on one side, or an asymmetrical change of pressure through the two sides, sets up temporary vertigo with nystagmus and other forced movements which characterize vestibular disturbances.

What, then, is the treatment for the great majority of cases of so-called Ménière's disease? Having scientifically excluded other factors, the treatment is directed to the Eustachian tubes. We should continue to treat local catarrh and remove its cause, and train the patient to keep his Eustachian tubes free. We should carry a Politzer bag, and if we intend to make sure of arresting an attack or series of attacks, employ the Eustachian catheter. This should not be despised. We should learn its uses accurately and carefully, for cases needing experience and practice are common. Only in cases of special difficulty need the physician despair. Are we, then, to regard bromides, iodides, purgatives, rest, and so on as erroneous measures? Far from it; their value is too well known, but their method of acting is not altogether clear. Is it possible that bromides diminish the reactivity of the individual to labyrinthine disturbances? Perhaps the iodides influence the nasopharyngeal secretion of mucus and make it more watery, as in other

parts of the air-passages. Quinine in minute doses, though possibly sedative to the vestibular system, just as large doses are irritative, may also derive its reputation from its anticatarrhal action, for there are certain persons, subject to winter head colds, who appear to derive immunity while taking minute doses of quinine daily without other drugs, or change of habits, residence, or mode of living.

We do not know with certainty how these drugs succeed and why they often fail, but the writer has attempted to suggest how they may sometimes succeed in restoring Eustachian tube efficiency. If this is a correct interpretation it enables us to understand the subtle relationship between the majority of cases of recurrent vertigo, commonly known as Ménière's disease, and Eustachian tube obstruction or inefficiency.

GONORRHEAL INFECTION IN CHILDHOOD.

BLAND (*New York Medical Journal*, March 20, 1920) after pointing out the frequency of gonorrheal infection in little girls states that in the great majority of cases of vulvovaginitis the infection is indirect and the organisms are conveyed to the children through ignorance and carelessness. Direct infection by coitus with the infected adult male is comparatively rare, although this theory was formerly generally and freely accepted.

As to parturient infection, most writers are unanimous in the belief that this type is relatively uncommon. This is due, in a large measure, to the fact that there is after birth almost immediate mechanical cleansing of the external genitals. Moreover, the large proportion of vertex presentations adds a certain degree of genital protection. Vulvovaginitis neonatorum is, therefore, relatively infrequent.

The majority of cases occur early in life, usually between the second and tenth years. The average age of 344 patients examined by Hamilton in the children's department of the Vanderbilt clinic was 5.1 years.

In most cases the systemic and local symptoms of vulvovaginitis are moderate and the course of the disease is also relatively mild. This is due to the absence of certain anatomical and physiological conditions. The vagina in the infant is short and the folds or corrugations of the mucosa are not prominent, therefore the gonococcus and its secretions do not find a favorable site of habitation or concealment. The infection, however, frequently extends as high as the cervix, and Hamilton has demonstrated involvement of this structure in every one of the forty cases personally investigated by him. Seldom does the infection extend higher than the cervix. Indeed, invasion of the uterine cavity is extremely rare, and, therefore, adnexal or peritoneal infection is naturally very unusual.

The little patient first complains of itching, which is quite constant day and night, and may be so pronounced as to interfere with the child's rest. This itching, and the rubbing incident thereto, may be the first signs to arouse the parents' suspicion of trouble. The child also complains of a burning or stinging sensation which is decidedly aggravated during urination. For this reason the child will refrain from emptying the bladder as long as possible. If marked urethral involvement complicates the trouble, the dysuria, of course, becomes more marked and the child suffers even in anticipation of emptying the bladder.

The duration of vulvovaginitis is as varied as its course. Many cases respond fairly promptly to treatment and tend to a favorable result; in others, despite every measure, the trouble persists and recurs.

The author's plan is to cleanse the vulva and vagina with large quantities of warm water for a period of two or three days. This is accomplished through a number fourteen soft-rubber catheter. After gaining the confidence of the child he employs Lugol's solution of iodine in warm water. He begins with a weak solution, usually one-quarter of a teaspoonful to two quarts of warm water, or approximately one-

quarter of one per cent. This is gradually increased to one per cent. The vulva is first thoroughly cleansed with this preparation, after which the catheter is introduced into the vagina and this canal is thoroughly flushed. No special amount is used. The solution is allowed to run until it returns absolutely clear, but not less than one gallon is used at a sitting. The irrigation is carried out morning and evening and continued for at least the first three or four weeks. In addition, once daily a twenty-five-per-cent solution of argyrol is instilled into the vaginal canal. Usually twenty minims or a medicine dropper completely filled is quite sufficient. At the same time the vulva is also painted with this material and a cotton pad moistened with twenty-five-per-cent argyrol is placed in contact with the labia and vestibule. At the expiration of a month or six weeks the irrigation is used only once a day, but the application is carried out daily. This treatment is continued until four successive negative smears are returned and also until the complement fixation test is negative.

CANCER DEATH-RATE IN NEW YORK CITY.

Bulkley and Coley *(Medical Record,* March 20, 1920) have made their studies from the mortality statistics of 1917, the last published by the United States, and from the weekly reports of the Board of Health of New York City in 1919, compiled from the actual return of death certificates; but these by no means reveal the true death-rate, for many cancer sufferers die from intercurrent diseases, as "the flu," under which the death is recorded, while in certain cases the diagnosis of cancer is withheld for personal or family reasons.

For the first time since 1906 the cancer death-rate per 100,000 population in the United States showed a very slight decrease in 1917 (the last report, just issued), 81.6 against 81.8 in 1916; the average yearly increase since 1906 had been 1.02 per 100,000.

According to a special report, just received from Washington, there has been a still further decline in the death-rate from cancer throughout the United States; that is gratifying, and may be due to wiser views as to treatment, but also partly to the high general death-rate due to influenza. In 1918 the death-rate from cancer was 79.8, a decrease from 1917 (when it was 86.6) of 1.8 persons per 100,000.

In the State of New York the cancer death-rate has continued to increase, 93.3 in 1917 against 92 per 100,000 in 1916. In some States it has fallen, but in some it remains very high: thus, Massachusetts 108.3, Vermont 107.7, Maine 105.9, New Hampshire 105.3, California 105.1, in the 100,000 population. Some States have a relatively low mortality: South Carolina 36.8, North Carolina 43, Tennessee 46.6, Virginia 53.3.

The cities naturally show a large mortality, owing to patients coming to them for treatment. Thus, the rates for 1917 are: San Francisco 152 deaths, Albany 150, Cambridge 134.7, Toledo 121.3, Boston 120.5. New York City by this report showed 85.6 deaths per 100,000, from malignant disease in 1917, against 84.5 in 1916.

In New York City the general death-rate has fallen greatly during 1919, compared to the preceding year, when the influenza carried off so many, the figures being 97,615 for 1918, and only 75,036 for 1919, a difference of 22,579, or a reduction of over 23 per cent.

But the recorded deaths from cancer have increased from 4894 in 1918 to 5124 in 1919—230, or more than 4.6 per cent, over the preceding year. This is remarkable and unexplainable, for in 1918 the cancer deaths were only 36 more than in 1917, less than one per cent increase. These 5124 cancer deaths in 1919 (2250 males and 2874 females), divided by 365 days make an average of over 14 deaths daily from the disease against 13.39 persons dying daily in 1918. The lowest number recorded in any one week was 81, or 11.52 persons, and the highest the surprising num-

ber of 132, or 18.83 daily, in the week ending December 20; the next highest week ending December 6, giving 119 deaths from cancer, or 17 average per day. There were 24 weeks in which there were reported 100 or more deaths from cancer.

The recorded deaths from tuberculosis in New York City have fallen during 1919 from 8823 to 7396, or 1427, that is 16.1 per cent, while those from cancer have risen over 4.6 per cent, an approach of the two of over 20 per cent. The deaths from tuberculosis were 7396 in 1919, and those from cancer 5124, a difference of only 2182. At this rate of change it will not take many years for cancer to outstrip tuberculosis in mortality.

ILEOSTOMY FOR POSTOPERATIVE OBSTRUCTION FOLLOWING APPENDECTOMY.

RICHARDSON (*Boston Medical and Surgical Journal*, April 8, 1920) notes that a distinction should be made between obstruction occurring spontaneously or late after operation, and that occurring early after operation, the type described by Deaver as postinflammatory obstruction. Although commonly grouped together in statistics, they differ both in pathology and prognosis. In the first class, consisting of spontaneous and late postoperative obstruction, we are dealing with a wide variety of pathological lesions, including firm organized bands and adhesions. In the second class, cases recently operated upon, the pathology is less uncertain. If mechanical obstruction exists, in the majority of cases it is caused by recent unorganized or partly organized adhesions, which present a greater hope of yielding or absorbing. Such adhesions represent temporary rather than permanent causes of obstruction. If we further limit this second class of cases to its largest group, obstructions occurring during convalescence from appendicitis, the probable pathological cause is even clearer. Here in all likelihood the causes of obstruction are adhesions of the lower ileum in the neighborhood of the original wound, right iliac fossa or pelvis, with local paralysis of a segment of bowel from sepsis as a possible contributing factor. We can further say that strangulation of a loop of bowel is unlikely.

While symptoms of ileus occurring shortly after operation for gangrene of the appendix with abscess or diffuse peritonitis are common, clear-cut mechanical obstruction is infrequent. Vomiting, distention, and obstipation, developing immediately after operation, characterized by absent or greatly diminished peristalsis and gas pains, are principally the result of peritoneal infection, and represent conservative efforts on the part of the individual to limit the sepsis. In such cases treatment, well directed toward aiding and maintaining the patient, Fowler position, proctolysis, gastric lavage, morphia, hot packs to the abdomen, enemata, pituitrin, etc., affords relief in the majority of cases. The outcome depends chiefly on the ability of the patient to overcome the infection; if this occurs, the bowel usually takes on its activity.

In a few cases of paralytic distention, although the patient appears to overcome the peritoneal infection within the first three or four days, and peristalsis becomes active, with gurgling on auscultation, and definite gas pains, yet distention and vomiting persist. Enemata occasionally give rather unsatisfactory results; occasionally obstruction appears complete. In such a patient, who is rapidly losing ground in spite of appropriate palliative measures, surgical interference comes in question. These cases cannot be considered as pure mechanical obstruction, nevertheless there is a definite mechanical factor in addition to the sepsis.

In other cases the distention and discomfort following operation subside, and the patient is apparently making a satisfactory convalesence. Toward the end of the first or during the second week, pain suddenly develops, followed by vomiting, distention, and evidence of increased peristalsis. Enemata become ineffectual. Acute mechanical obstruction has obviously occurred.

Such obstruction has occurred in under 2 per cent of the author's appendectomies requiring drainage, and in none of the undrained. Since the probable cause of obstruction is fixation by recent adhesions, there is a natural tendency to persist for a while in palliative measures, in the hope that the obstruction will be overcome. The decision as to which cases will free themselves spontaneously, as well as when the proper time has come to interfere, is a difficult one. The author feels very strongly that the conservative thing is to operate early. It is not claimed that the cases here presented would necessarily have died of obstruction if not operated on. It is far better to operate occasionally unnecessarily than to postpone operation until the later stages of obstruction have developed.

If the operation is undertaken, we have naturally greater latitude after clean appendectomies. In suppurative cases a fresh incision under local anesthesia internal to the original one is advisable. If bloody serum is found on opening the peritoneum a search for a strangulated loop of bowel is naturally suggested. If not, we now have two possible courses: first to find and free the point of obstruction, or second to provide drainage of the bowel, either externally or by a short-circuiting operation. If we look for the obstruction and separate the adhesions forming it, raw fibrinous areas are left on the bowel which immediately readhere elsewhere, the bowel distention persists, septic material may spread from the drainage tract, the bowel wall may be extremely friable from distention and edema and tear, and lastly the operation may be severe for a reduced patient. Obstruction may persist or recur, and we may have only exchanged one obstruction for another, particularly if a segment of the bowel is partially paralyzed from sepsis. The obstruction may be short-circuited by ileocolostomy without disturbing adhesions. But this also means a considerable operation. Drainage of the bowel may be provided more directly and with far less disturbance to the patient by ileostomy under local anesthesia. It has the obvious disadvantages of fecal discharge, fluid loss, frequent skin irritation, and possible secondary operation for closure. The whole question is how often, when done for obstruction by plastic adhesions, will an ileostomy first relieve the patient, then close spontaneously, and so serve not as a palliative but as a curative procedure.

Of the seven cases, in one a cecostomy was done on the third day under local anesthesia in a man of forty-five with paralytic distention following appendectomy for gangrenous appendicitis with general peritonitis. Death followed in twelve hours. In a second, a child of ten, recovery followed reduction of an ileo-ileal intussusception occurring on the fourth day after a clean appendectomy. In the remaining five cases ileostomy was done. Four were children of eight or nine years, and one a man of twenty-one. Obstruction occurred on the sixth to tenth day. One child had previous enterostomy through the original incision on the eighth day by another surgeon with temporary relief. A second ileostomy was done on the tenth day.

The technique was similar in all cases; an incision through the inner border of the right rectus or median line, choice of a distended bowel loop which appeared lowest and therefore nearest to the point of obstruction. In two cases visible peristalsis gave a clue to the proper point of incision. In four cases the peritoneal cavity was free from adhesions except in the neighborhood of the original incision. Enterostomy was done in all cases with a flanged glass tube and a purse-string suture, with no attempt to make a valvular opening to aid closure.

The after-course in all cases was similar; with the relief of the distention, the bowel moved spontaneously on the third to fifth day. This strongly suggests that in the type of cases operated on an obstruction by angulation of the ileum, as described by Cheever, existed. Fixation of the bowel probably occurred with angulation proximally. Distention of the bowel then made a valvular obstruction, which became

tighter the greater the distention and the more active the peristalsis. With distention relieved, the bowel contents carried by the lateral enterostomy opening, and by bearing upon the point of obstruction, tended to stretch and free the adhesions. It also suggests the chief measure to be taken to avoid the development of obstruction, in addition to the obvious one of early operation, avoidance of trauma, and care in placing drainage, is the avoidance of active catharsis during convalescence. This becomes imperative if symptoms suggest partial obstruction. If the bowel contents are driven against a point of adhesion, overdistention and valvular obstruction are all the more likely to occur. Should obstruction develop, it also suggests that measures tending to relax the bowel, rather than stimulate it and increase local overdistention, are more likely to result in relief of the obstruction. It is in this way through relaxation of the bowel that the occasional relief of obstruction by spinal anesthesia probably occurs.

The after history of the five cases has been similar. The enterostomies all closed spontaneously in from four to seven weeks, although some of them seemed extremely unfavorable in the beginning. Their behavior would make the author extremely slow to close a lateral enterostomy by secondary operation, provided satisfactory movements were taking place by rectum. One case reports well, by letter, after eight years, two after about three years, and one after one year. One case, after two years, is well except for a recurrent sinus in the original appendectomy wound. The ileostomy has remained healed. Relief of the obstruction in these cases has apparently been permanent.

REVIEWS.

A Diabetic Manual for the Mutual Use of Doctor and Patient. By Elliott P. Joslin, M.D. Second Edition, thoroughly revised. Lea & Febiger, Philadelphia, 1919. Price, $1.75.

From time to time in past years we have, in reviews of other books, pointed out how difficult it was for a medical man to prepare text for the laity which on the one hand would be satisfactory to this class of readers and on the other hand be beyond the criticism of his medical colleagues. We are aware of the fact that many physicians think it wise to train their diabetic patients in the examination of their own urine. This plan has never appealed to us because most diabetics are nervous and apprehensive, and any increase in their nervousness and any cause which increases mental depression tend to make the disease worse. Furthermore, because of their condition they are often difficult to handle, and if a book which gives them a certain amount of information (but which cannot give all facts for several reasons, for even medical men do not know all the reasons themselves) is placed in their hands they are liable to illustrate the old adage that "a little knowledge is a dangerous thing." It would seem to us that there is no disease which afflicts mankind in which it is less desirable to give a handbook as to diet and treatment than this malady. Indeed we think that many readers will decide that this book will enable them to treat themselves without the aid of a physician, since definite orders are given in italics telling them what to do, as, for example, "if glycosuria persists at the end of four days, give one gramme of protein (0.1 grm. of carbohydrate) per kilogramme per body weight for two days, and then again for three days unless thoroughly sugar-free, etc." It must be recalled, however, that Dr. Joslin has had a wide experience, and if he has found this plan useful it has much to support it. The

scientific statements in the text are, of course, beyond criticism.

We think that the dedication of the book will do much to inform physicians as to how they should regard it. It reads as follows: "To help make the home safe for the diabetic is the object of this book."

THE SIMPLIFIED INFANT FEEDING. By Roger H. Dennett, B.S., M.D. Illustrated. Second edition, revised and enlarged. J. B. Lippincott Company, Philadelphia, 1920.

Five years ago last January the first edition of Dr. Dennett's book upon this subject appeared. In the present edition he points out that the usefulness of boiled milk, which in 1915 was scorned by many, is now almost universally accepted by the pediatricians of this country and that simple dilutions have come to stay. He further indicates that although the methods of preparing foods for infants have not been materially changed, there have been new and helpful additions to our knowledge of infant feeding, and these have been utilized in the preparation of the present text. The additional matter has been provided on the subject of dried milk, acidosis, etc., the chapter on diarrhea has been extensively revised, and that on acidosis has been revised by Dr. Pease.

The author states that the book was never intended to be a review of the literature on infant feeding because there are a number of excellent books on that topic, but it was written to help the general practitioner, and particularly the postgraduate student, to successfully feed babies as he meets them in his practice.

The book is well printed, is in large type, and contains a little less than 400 pages. In its thirty chapters it deals with the general problems involved in the preparation of foods for infants, with a classification of diagnoses of diarrheas in bottle-fed babies and their treatment, loss of appetite, weaning, and with the use of the various modified foodstuffs that are prepared by manufacturers for the nutrition of infants. There is also a chapter upon the normal development of infants.

The book is a useful practical manual along exactly the lines that we have just described.

PATHOLOGICAL MICROÖRGANISMS. A Practical Manual for Students, Physicians, and Health Officers. By William H. Park, M.D., and Anna W. Williams, M.D., assisted by Charles Krumweide, Jr., M.D. Seventh edition, enlarged and thoroughly revised. Lea & Febiger, Philadelphia, 1920. Price, $6.

The first edition of this book was called "Bacteriology in Medicine and Surgery" and was written to make available for others the practical knowledge which had been acquired in the work of the bacteriological laboratories of the city of New York. It was intended more for medical practitioners than for medical students or laboratory workers, but when the second edition had been exhausted, the improvement in methods of cultivating and studying the protozoa had reached a point rendering it advantageous to include the animal as well as the vegetable parasites. With the third edition, therefore, the scope of the book was materially increased, and it is now a volume of nearly 800 pages, including the index, most carefully prepared and most practically arranged for use in the laboratory, for study by students, and for reference by practitioners of medicine and surgery.

The senior author, Dr. Park, is so well known from coast to coast and abroad as one of the leaders in his department of medicine that it is not surprising that the book has reached seven editions in a few years, but the chief cause of its success has been the excellent character of the text.

A TEXT-BOOK OF DERMATOLOGY. By J. Darier. Authorized translation from the second French edition, edited with notes, by S. Pollitzer, M.D. Illustrated. Lea & Febiger, Philadelphia, 1920. Price, $8.50.

The first edition of the translation of Darier's well-known book on dermatology was exhausted several years ago, and the delay in the appearance of the second edition has been due to the Great War. As is indicated in the title page, the American translator has gone over the text carefully and has added such notes as he deems nec-

essary to make the volume represent not only French but American dermatology. The editor recognizes that there is no dearth of excellent treatises on this subject in the English language, but because of the practical character of the text and the reputation of the editor is confident that it will stand as high as any of them in professional regard.

Possibly Darier's greatest characteristic as a writer is his clear description of disease in brief compass and, as the editor points out, his obvious habit of linking lesions in relation to their anatomical structures and the diagnosis with the general pathology. This is a most important point too frequently overlooked by all specialists, who are prone to become so narrow that they are wont to regard the diseased part alone with little thought to the underlying deeper structures and the viscera.

The book is printed on excellent paper, in bold type, and is illustrated with 204 engravings and four colored plates. It covers nearly 800 pages, and, therefore, is not as large as some other books on dermatology, but is considerably more complete and thorough than a number of so-called manuals dealing with this subject.

PROGRESSIVE MEDICINE. A Quarterly Digest of the Discoveries and Improvements in the Medical and Surgical Sciences. Edited by H. A. Hare, M.D., assisted by F. L. Appleman, M.D. Volume II, June, 1920. Lea & Febiger, Philadelphia, 1920.

The June issue of Progressive Medicine contains this year, as in previous years, an excellent article upon Hernia by Dr. Coley of New York; one upon Surgery of the Abdomen, Exclusive of Hernia, by Dr. Wilensky of the same city; an exhaustive article upon Diseases of Nutrition and Metabolism by Dr. Elmer H. Funk of Philadelphia, including in his subject Diseases of the Glands of Internal Secretion and Diseases of the Blood and Spleen; an article by Dr. Charles of St. Louis summarizing the ophthalmological literature for the past twelve months; and by no means least in importance, an article of about seventy-five pages upon Gynecology by Dr. Clark of Philadelphia. Each of these contributors is actively engaged in teaching or in hospital practice. They are thoroughly familiar with their subjects and have faithfully adhered to the fundamental idea governing Progressive Medicine, namely, that it shall not be a mere series of excerpts from the literature of the last twelve months, but a story embodying what that literature contains, with such criticism or approval of the methods described as the writer of the article deems proper.

The present volume, like its predecessors, is illustrated in black and white and with a colored plate.

PRACTICAL DIETETICS, WITH REFERENCE TO DIET IN HEALTH AND DISEASE. By Alida Frances Pattee. A. F. Pattee, Publisher, Mt. Vernon, New York; 13th edition.

This book first appeared in 1903. The fact that it has reached 13 editions with a number of reprintings in seventeen years shows that it must have met a need. It is dedicated to the trained nurse and deals quite exhaustively with its special subject, covering nearly 500 pages, including the index. It does not deal, as its title indicates, with the problems of nutrition in a highly scientific manner, but is chiefly devoted to directions as to the preparation of food and special recipes for those who are ill, with definite dietetic tables for diabetics, and other patients who need a carefully regulated diet. Much information of great value to both physician and nurse is found in its pages, although, of course, it does not attempt to be an original contribution to the subject.

A MANUAL OF PHYSICAL DIAGNOSIS. By Austin Flint, M.D., LL.D. Eighth edition, revised by Henry C. Thacher, M.S., M.D. Illustrated. Lea & Febiger, Philadelphia, 1920.

That a book on physical diagnosis written approximately fifty years ago should reach an eighth edition, even when revised by so competent an authority as Dr. Thacher, is a very clear indication of the remarkable value of the text. Methods of

diagnosis, of course, have changed marvelously since the elder Flint first produced his volume, but the same skill which he used in the examination of patients was exercised in the production of his text. Probably the most potent reason that the book is still alive rests in the fact that it is essentially a clinical manual, not overburdened with theoretical discussions, but gives the practitioner every aid that is needful in the performance of this part of his work. The volume does not profess to be one of diagnosis as a whole, but is strictly limited to physical diagnosis.

CUNNINGHAM'S MANUAL OF PRACTICAL ANATOMY. Revised and edited by Arthur Robinson. Seventh Edition, Volume II, illustrated. William Wood & Company, New York, 1920. Price $4.

A short time ago we noticed the appearance of Volume I, which it will be remembered dealt with the anatomy of the superior and inferior extremities. Volume II deals with the thorax and abdomen, and Volume III, which has not yet appeared, will deal with the head and neck. Each volume is of about 500 pages, somewhat closely printed but easily read, illustrated in black and white and in colors.

Cunningham's Anatomy, like Gray's Anatomy, has been a standard for many years, and the revision of the 7th edition by the Professor of Anatomy in the University of Edinburgh speaks for the accuracy of the present issue. The book lies between some of the very large standard works in anatomy and the small handbooks on this subject; the latter being inadequate as a rule and the former often clumsy for the practitioner who wishes to look up some particular point. Possibly the greatest use of these three volumes will be by the students, particularly during the time that they are at work in the dissecting room.

THE JOHNS HOPKINS HOSPITAL REPORTS. Volume XIX. The Johns Hopkins Press, Baltimore, 1920.

This volume of 355 pages contains three contributions: (1) The Structure of Normal Fibers of Purkinje in the Adult Human Heart and their Pathological Alteration in Syphilitic Myocarditis, by O. Van Der Stricht and T. Wingate Todd; the second article is upon The Operative Story of Goitre with special reference to the author's operation, by William S. Halsted; while the third deals with Arterio-Venous Fistula with an Analysis of 447 Cases, by Curle L. Callander.

The first article covers 71 pages, Halsted's article about 175 pages, and the last article about 90 pages. The volume is well illustrated, contains copious bibliographies of the subjects treated, and details cases that have been studied.

THE MEDICAL CLINICS OF NORTH AMERICA, May, 1920. W. B. Saunders Company, Philadelphia, 1920. Price in paper $12 a year.

The present issue, which is No. 6 of Volume III of the Medical Clinics of North America, contains 23 reports of clinics and the index to the volume, which index incidentally is quite copious. The contributors are all of them Chicago clinicians. The subjects cover a wide scope, from Colic in the Breast-fed Infant to Abscess of the Brain and Hypertension in Women at the Menopause. Possibly the most timely contribution is that on Lethargic Encephalitis by Dr. Mix.